COAL AGE

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There's an old saying worded something like this: "A man would never know he had neighbors were it not for the women folks." The following is clipped from a recent issue of an Alabama paper and was written by a woman. Until now we never knew, or at least never realized, the manifold beauties of our mines. When we might toil in such a picturesque place and amid such romance, why should any of us want to remain on top?

* * *

"The mine machines, viewed in a machine shop, or on the surface where they are lifeless, inanimate—do not attract you.

"But come below. Now see them. They are huge shadow shapes in a quivering sensitive dark. Each one attacks a solid wall of coal, advances a long saw-like cutter bar beneath the seam at one rib of the room and feeds itself across the entire length of the face at a speed of thirty inches per minute.

"See that cutter down at Mulga—you'll never forget it! See that longwall cutter at work in Montevallo! Get lost in the depths of a great mine—these vast, strange, petrified forests of a thousand centuries ago—here are the works of Hephaistos himself come true! If ever there was a place where fancy itself may run wild riot, it is down a deep coal mine.

" 'Hear the gas?' the engineers with you halt where the track swerves off to another one of the entries into another 'room.' All is quiet save a far-off trickling sound, slight and musical.

" 'Why, like a little waterfall somewhere.' You stop and listen dumbfounded. 'Some water there, too,' says the mine superintendent, 'gas and water mixed.' The sound goes on. It never, never stops. In the silent, subtle dark it even seems to increase, until, in fancy, a hundred little white streams steal through the ancient coal plants, the black roots, the reeds, the shadowy ferns and mammoth trees buried there these million years. The old coal forest is *young again, all quivering with light and life and passion for the sun.*

"Half lost in the everlasting gloom near the rigid heading, the miners swing their pit lamps up to the low roof, where close under a stratum of slate, above the shining band of coal, ever lurks that alluring sound, the voice of a mysterious invisible vapor, poisonous breath of the long imprisoned coal plants—the deadly firedamp.

"Instantly it catches fire. Quick as forked lightning, treacherous, wild, fantastic—golden hair of the Lorelei—it plays over the face of the coal. 'Light carbureted hydrogen,' explains the engineer, 'as cooly as though he were saying, 'Fine weather we're having today.'

"The witch-like strands of the blue and yellow flames leap now like strange live things. 'The ghosts of the mines!' says the superintendent as he and the miners quietly beat out the flames.

"D'you wonder the niggers take 'em for ghosts?"

* * *

No! we are not surprised that the darkies are superstitious, but we do wonder what would have happened if about that time a full-grown rat, or perhaps two rats, "buried there these million years, should have become *young again, fresh again, all quivering with light and life and passion for the sun.*"

A Recent Utah Coal-Mine Development

By W. R. Elliott*

SYNOPSIS—The topography of the country practically forbade surface haulage from the mine to the tipple. An aërial tramway was therefore installed and a type of mine car developed, the body of which is composed of two tramway buckets which may be lifted from the supporting truck by the tram carriers, and thus conveyed down the mountain to the loading tipple spanning the railway tracks.

About the middle of 1912 the Spring Cañon Coal Co., an affiliated interest of the Knight Investment Co., of Provo, Utah, decided to develop its property, comprising a total of 2000 acres in Carbon County, Utah, and located about five miles up Spring Cañon from the town of Helper, a division point on the Denver & Rio Grande R.R.

Three workable coal beds underlie this acreage. These are known as Nos. 1, 2 and 3, the vertical distance between No. 1 and No. 3 seams being 180 ft. The coal in all these measures is jet black, heavy, hard and compact, has excellent luster, without stains, spots or pyrites. The average analysis of the samples from the different deposits are as follows: From the upper or No. 3 seam, volatile matter, 43.4 per cent.; fixed carbon, 51.2; ash, 3.6; moisture, 1.8; sulphur, 0.89; heat content, 14,725 B.t.u.; thickness of deposit, 8 ft. From the middle or No. 2 seam, volatile matter, 47.4 per cent.; fixed carbon, 47.2; ash, 4.6; moisture, 0.7; sulphur, 0.98; heat content, 14,739 B.t.u.; thickness of deposit, 4 ft. 8 in. From the lower or No. 1 seam, volatile matter, 46.7 per cent.; fixed carbon, 46.9; ash, 4.5; moisture, 1.9; sulphur, 1.07; heat content, 14,547 B.t.u.; thickness of seam, 9 ft.

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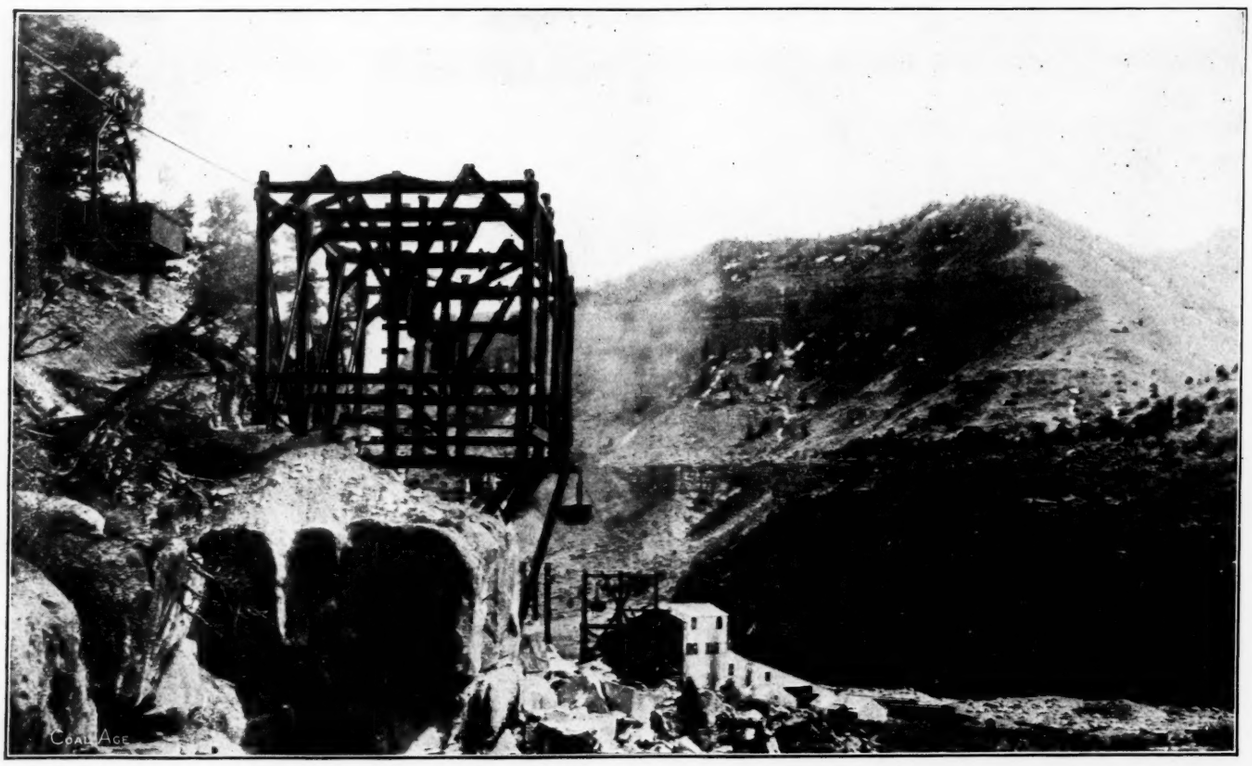
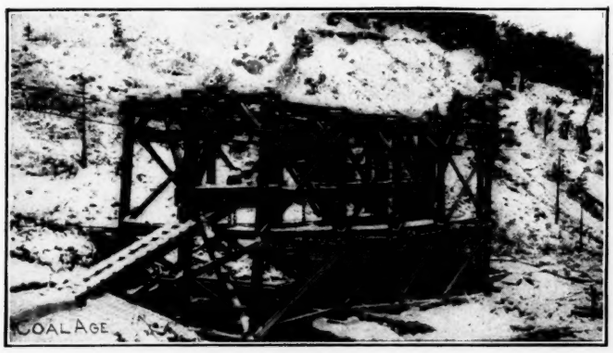
A Branch Railroad Was Necessary

A branch line was built from the Denver & Rio Grande at a point immediately north of Helper to a place where a satisfactory tipple location could be secured, a distance of approximately four miles. For a distance of 3000 ft. between the tipple site and the southern extremity of the property where development work was commenced, the topography of the ground was such as to preclude the railroad being extended further, unless Shay engines were secured to operate thereon. The branch, as constructed, has a maximum gradient of 3.87 per cent., with curves of 10 deg. It is laid throughout, including the tipple tracks, with 75-lb. rails. The Spring Cañon Coal Co. owns its own roundhouse, water tank, etc., these buildings being located at the Helper terminus of the branch, and the present motive power consists of two consolidation-type locomotives.

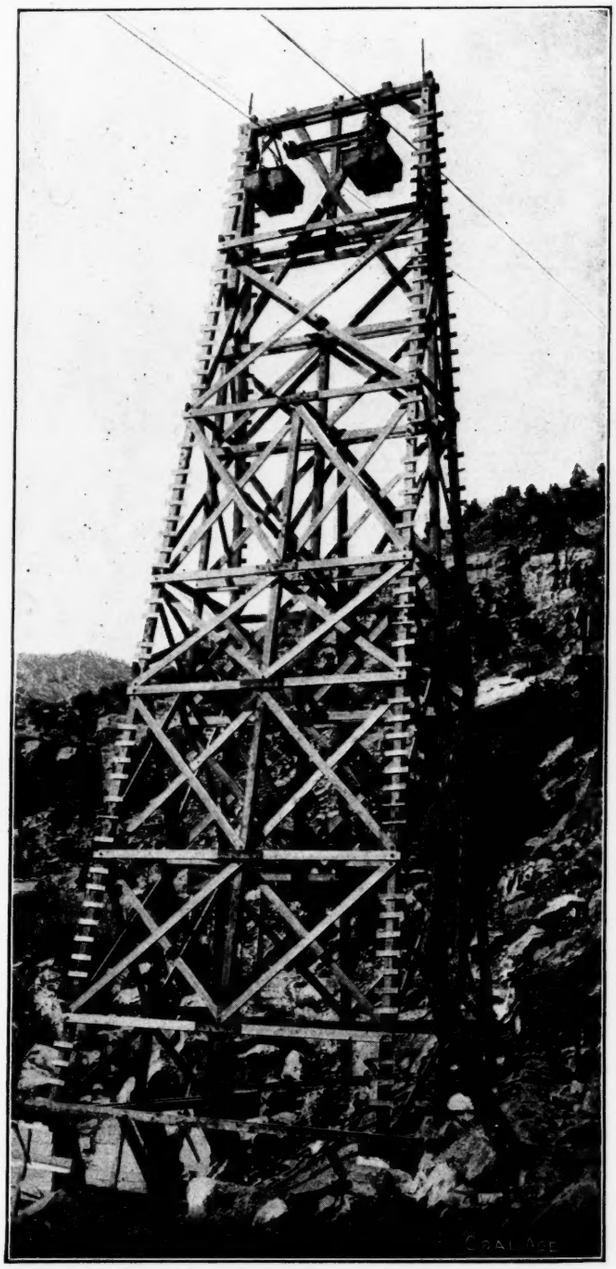


The Four-Saddle, Overhanging Tower Where a Decided Change in Grade Is Made

Two systems of coal transportation from the mine to the tipple were considered, namely, surface and aërial tramways. The sides of the cañon are precipitous. There are also one or two tributary cañons over which high and expensive trestles would be necessary if surface haulage were employed. In consideration of the foregoing, the aërial tramway was selected as the most satisfactory solution of the conveying problem. This apparatus was



THE CABLE BACK-BALANCE

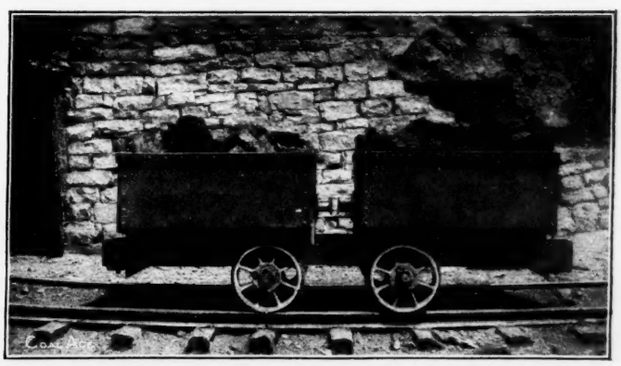


ONE OF THE TRAMWAY TOWERS

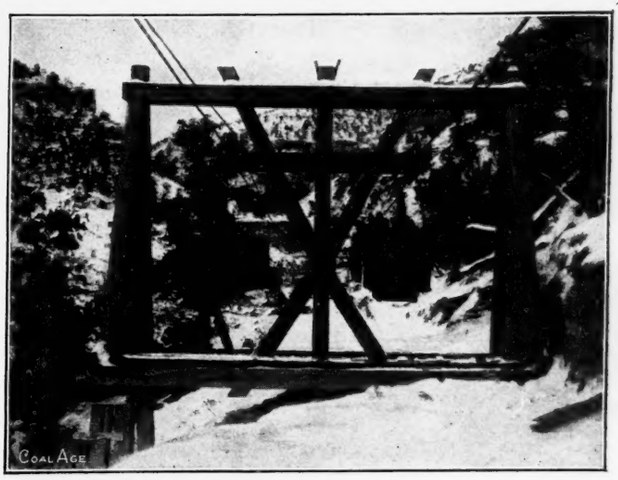
furnished by the Trenton Iron Co. (now the American Steel & Wire Co.), and was installed under the direction of its engineers, Messrs. Carstarphen & Holmes.

Although most of the construction work was done during the coldest weather of winter, no time was lost. The final plans were received Jan. 9 and the last carload of machinery on Jan. 23. The line was started on Feb. 13, and has been in continuous operation ever since.

A LOCOMOTIVE AND TRIP OF CARS



THE TWO-BUCKET MINE CAR



ONE OF THE TOWERS, SHOWING THE LARGE BUCKET CLEARANCE

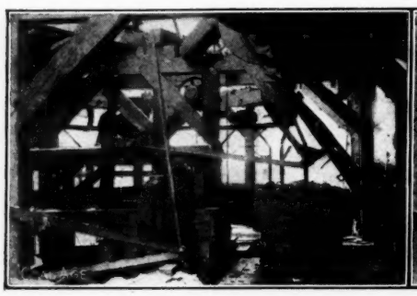
Owing to the abrupt topography of the cañon and the location of the tramway, considerable ingenuity was necessary in the design of some of the supporting structures. At one point, where a sharp change of grade takes place, the vertical curve in the cable is divided between four saddles. One side of this structure rests on solid rock, while the other is cantilevered over the edge of the

precipice. At the loading terminal, one end of the structure is carried on a 50-ft. arch truss. The line is 10-ft. gage and the towers are so designed as to allow ample clearance when the buckets are swinging. This was necessary on account of the high winds that prevail in the winter. Lock coil cable is used for the tracks, the one for the loaded buckets being 1⅝ in. in diameter, while that for the empties is 1¼ in. in diameter. These cables rest in grooved saddles supported by 10-in. channels on towers. Each is anchored at one end, while at the other it is attached to chains, which, in turn, pass over heavy sheaves and are fastened to weight boxes. This method of back-balancing at all times maintains a uniform tension on the cables independent of the loading or weather conditions. The gross weight of box and stone on the loaded cable is 35 tons, and on the smaller cable, 16 tons. The weight boxes are so suspended, that when the loads are off the line, the box rests on the ground, and when the line is loaded, the box springs clear. This relieves the cable from the total strain when not in use, and increases its life.

The difference in elevation of the terminals is 321 ft., of which 225 ft. occurs in the first 1300 ft. from the loading terminal. This inclination is sufficient not only to run the tramway, but to develop considerable power. The tramway is motor-driven and required 12 hp. to start off with the empty buckets going up hill. After being limbered up about 15 hp. was developed, with a loading equal to 75 tons per hour. At the ultimate capacity of 250 tons per hour, approximately 50 hp. will be developed.

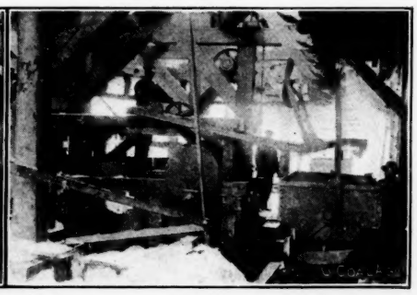
This is no inconsiderable item and is not wasted. The motor acts equally well as a generator and returns surplus current to the power line, at the same time acting as a brake to regulate the speed of travel. Brakes are also provided on both the main drive and pinion shafts for stopping the line and controlling its speed, should any accident occur to the motor or other connections.

The traction rope is a ⅞-in. lang-lay cable and is maintained at proper working tension by a 5000-lb. back balance. The rope speed is 500 ft. per min., this having been found most desirable for the loads handled. The tension sheave of the traction rope is 10 ft. in diameter and is located at the discharge terminal. This sheave runs upon a bearing mounted on a truck connected to the weight box and set at a considerable inclination from the horizontal to compensate for the difference in level between the empty and loaded tracks.

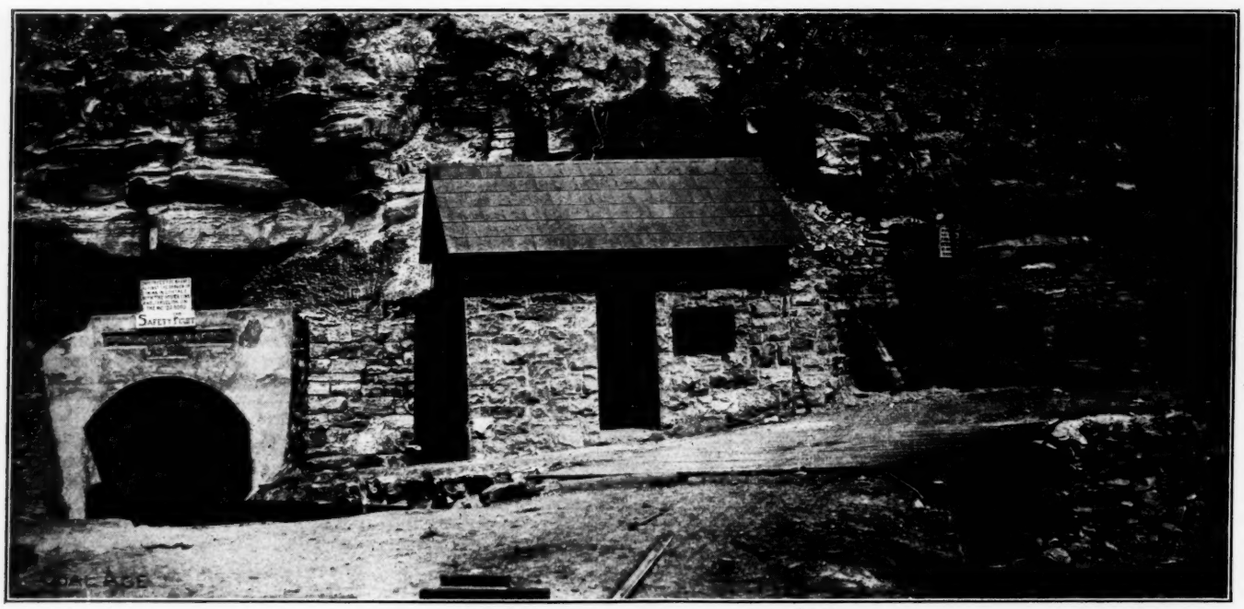


Car in Position on Transfer Table

Hangers Engaging the Bucket Trunnions



Platform Depressed, Buckets Suspended



Mine Foreman's Office and Empty and Loaded Tracks. Note Safety First Signs over Both Openings

A Peculiar Coal-Mine Car

The tramway buckets are so made that they may be placed, two at a time, upon a suitable truck, which is

run into the mine and otherwise handled exactly the same as an ordinary mine car. From these trucks the loaded buckets are transferred to the overhead cableway at the loading terminal by means of an apparatus called the "transfer table."

As above stated, the trucks come from the mine carrying two buckets each of a nominal capacity of 2000 lb., but in actual practice, the average weight of contents is 2300 lb. The mine locomotive pushes the cars over a knuckle from whence they coast to the scales. Immediately in front of these are set the blocks or squeeze-brakes consisting of a pair of heavy timbers set one on each side of the track. These are pivoted on the end next to the approaching cars and clear the wheels slightly. The other ends are connected with links and levers to allow of their being closed sufficiently to prevent the cars running through. When the operator stationed here releases this brake, the cars coast across the scales into the loading terminal of the tramway.

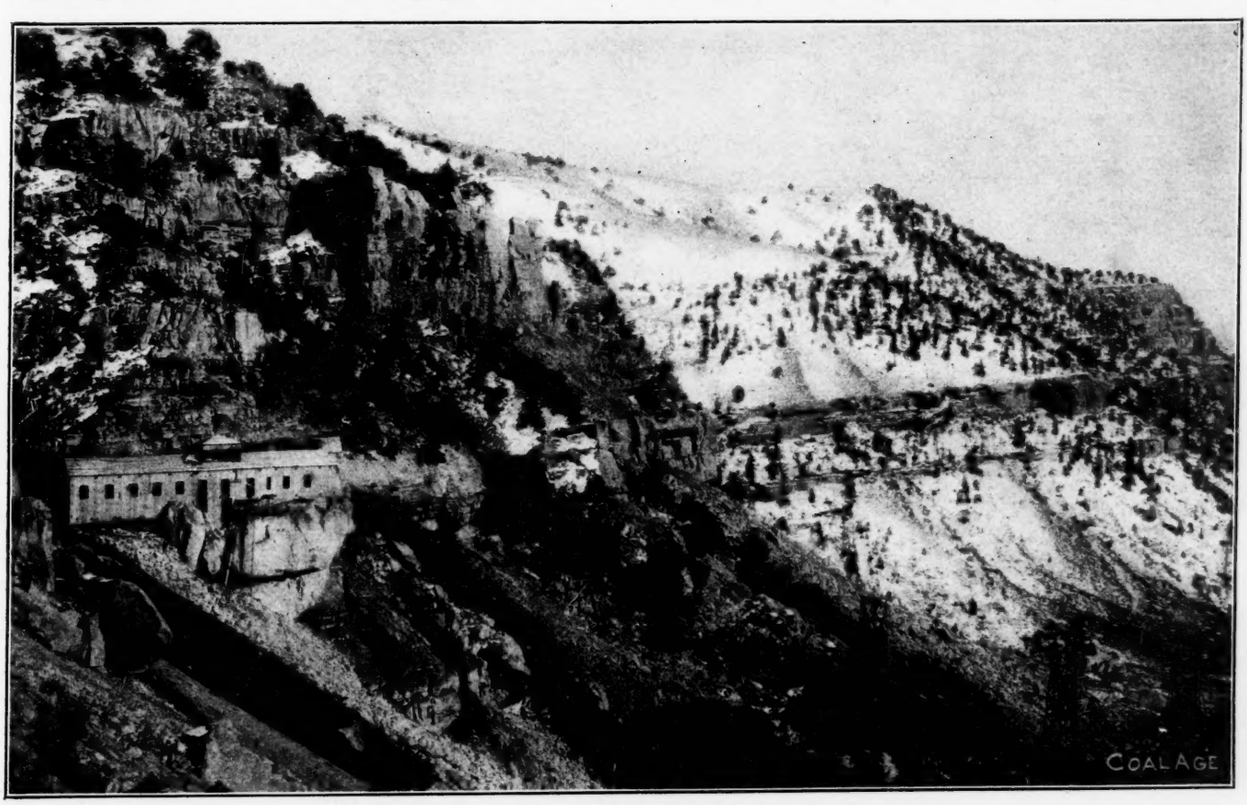
After passing the scales the cars are stopped upon the adjoining transfer table. This is a large platform pivoted at one end, the other being connected to a pair of cranks driven by an electric elevator machine and capable of being raised or lowered as desired. The track crosses this platform near the center, where there is a vertical movement of about 12 in.

A pair of hangers having been previously positioned on the overhead rail above the transfer table and pushed outward to clear the approaching loaded truck, the table is raised. This operation brings the platform track level with that of the scales. The car is run upon this platform, the support for the empty hangers withdrawn, permitting the hooks forming the ends of the hangers to fall beneath the trunnions of the buckets. The platform is then lowered which leaves the buckets suspended by the hangers from the overhead rail. They immediately coast to the front of the terminal, where an operator is stationed to space them at regular intervals.

A gong geared to a sheave wheel gives warning when the proper distance has been attained for attaching the bucket. The platform meanwhile remains down until two empty buckets have been positioned over the truck. The operator then throws a switch; the platform rises and the empty truck thereon lifts the buckets clear of the hangers, which are then pushed outward and the latch holding the truck in position on the platform withdrawn. This allows the car to run through a switchback and coast into the mine.

The Transfer Tables Are Duplicated

In order to facilitate the rapid handling of buckets two transfer tables are provided, so arranged that one man can operate both at the same time, or either independently. The time cycle for complete operation on one table is 40 sec., or for the two tables, 50 sec.; but four buckets are transferred with the two tables, while only two are handled with the one.



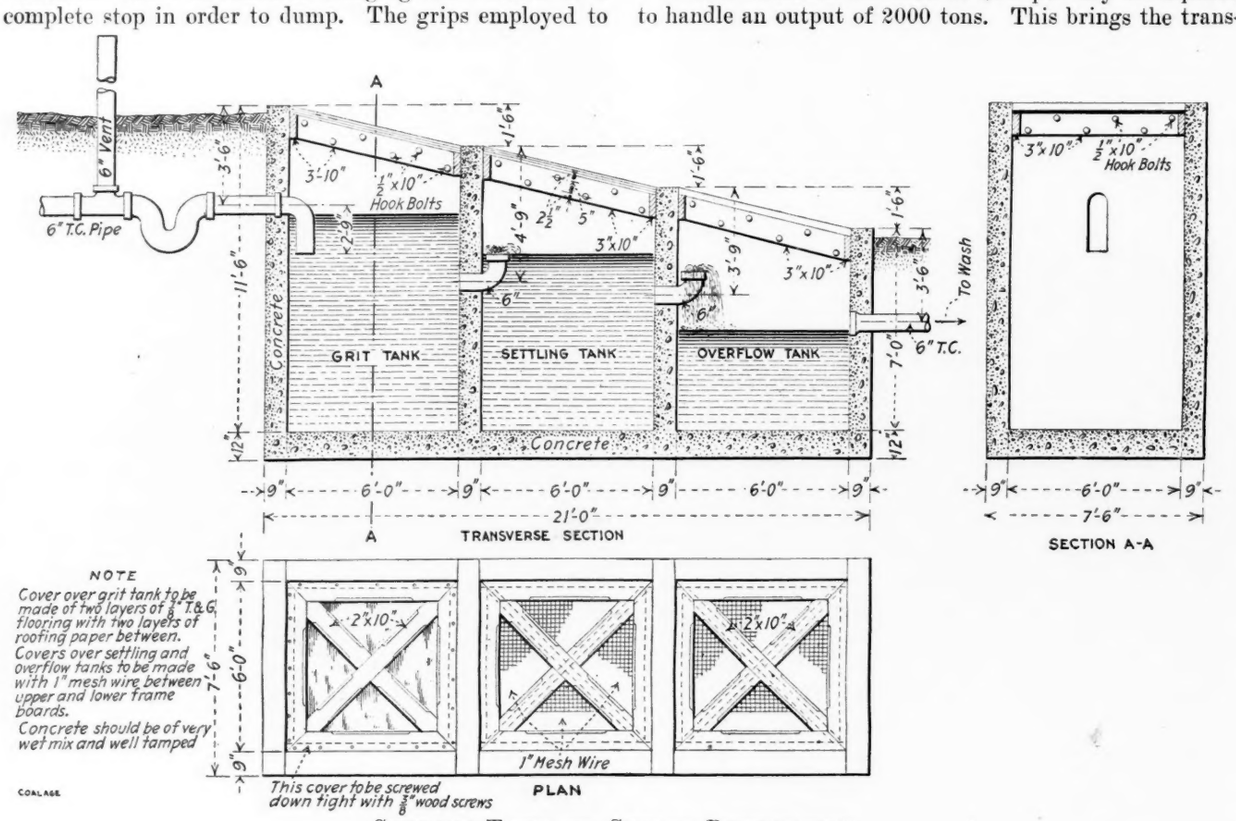
The Head of the Conveyor Line. Note Character of Country

The loading terminal is located on a ledge of rock, and all available space was utilized to the best advantage. The driving and breaking mechanism is placed in an excavation beneath the floor, the traction rope passing around sheaves 8 ft. in diameter to eliminate bending stresses. The track to the kick back passes directly over the wheel pit and between the incoming and outgoing parts of the traction rope.

The track, or suspension cables for the buckets enter-

ing and leaving this station, have a difference of elevation of 4 ft., to give necessary grade for the buckets to run freely anywhere in the station without assistance from the operators. The difference in elevation of the cables here required a difference of half that amount on the first tower from the loading terminal. On other towers the empty and loaded cables are carried at the same elevation with the exception of the tower next the discharge terminal, where a difference also exists.

The discharge terminal presents only one unusual feature—that of having the hopper located under a sharp curve in the overhead rail at the extreme end of the structure. This necessitates bringing the buckets to a complete stop in order to dump. The grips employed to secure a hold upon the traction rope are operated directly by the weight of the load they carry. Thus, the heavier the load the greater the pressure exerted by the grip jaws on the cable. These grips can only be relieved by bodily lifting the load and depressing the tracks simultaneously. This is accomplished in the terminal by attachers and detachers wherein the load is lifted by side rollers rising on incline planes at the same time the track is depressed. This causes the jaws to remain open long enough for the rope to enter or leave the grip as the case may require. This operation is entirely automatic, the grip at all other times remaining closed.



SETTLING TANK FOR SEWAGE PURIFICATION

A FREIGHT ELEVATOR FOR HANDLING SUPPLIES

A freight elevator is installed at the discharge terminal to facilitate the transportation of material brought in on the railroad for use in the mine. This elevator is 10x6 ft., with a lifting capacity of 2500 lb. It is equipped with modern safety speed governor and automatic limit stop, which prevents the platform from running beyond the terminal landing and thereby causing accidents. Material elevated from the ground to the floor of the discharge terminal is conveyed to the mine over the tramway in the coal buckets or by special hangers adapted to such material as steel rails.

Particular attention has been paid to the problem of lubrication, grease cups being provided for all bearings, sheaves and rollers on the entire tramway. The terminals are housed in with corrugated iron, which has been painted. The towers also have been painted, furnishing a pleasing contrast with similar installations often left in the rough state.

A total force of ten men at $35 per day is required to handle an output of 2000 tons. This brings the transportation charge from mine to tipple to 1¾c. per ton. Had the conditions governing the location of loading terminal and tipple been favorable, this would have been materially reduced.

The tipple building, which is steel construction throughout, was built by the Ottumwa Box Car Loader Co., and is equipped with shaker screens which permit the standard separation, common to the district, to be made. After discharge from the tramway into a bin, provision has been made for picking the coal on a suitable table 30 ft. long between centers and 5 ft. wide. It is hardly probable, however, that this will be required in view of the clean condition of the coal naturally. This conveyor may, however, be used as a feeder.

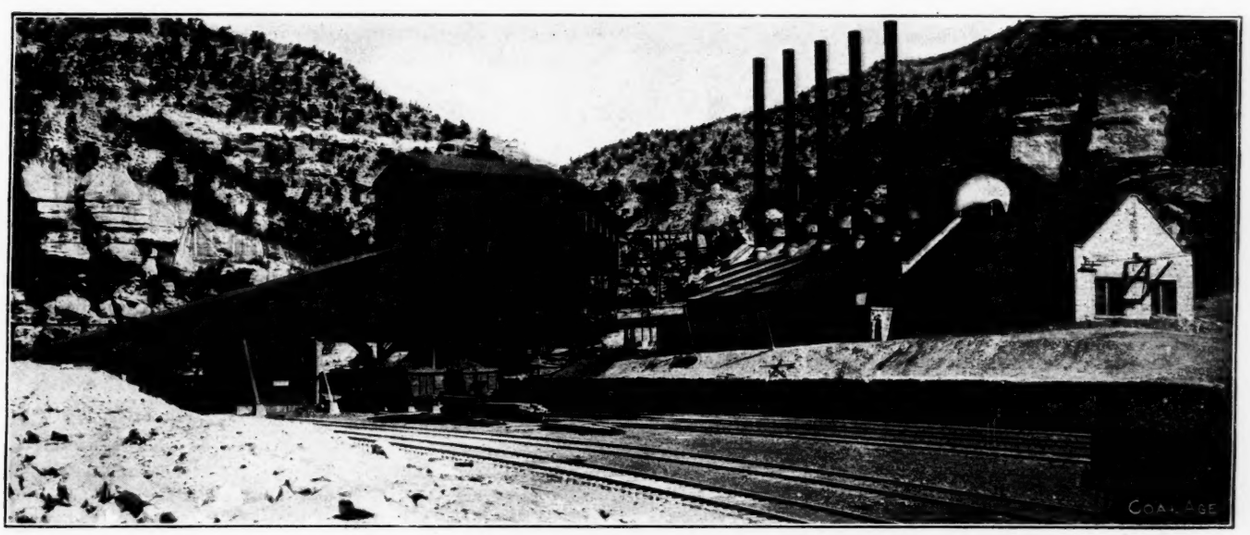
Two box-car loaders are installed adjacent to the outside track, permitting the loading of lump and nut, or run-of-mine into cars upon either track. Provision is also made for coaling the engine with run-of-mine or lump.

A WELL EQUIPPED POWER PLANT

The power-plant building is a substantial stone struc-

ture with an asbestos shingle roof carried upon steel trusses. A bin for boiler coal extends the length of the boiler house, the fuel being conveyed thereto by a belt and screw conveyor. Steam is generated in five Scotch marine boilers of 150 hp. each manufactured by the Springfield Boiler & Manufacturing Co. The power-house equipment consists of two 250-kv.-a. sets and one 50 kv.-a. set. The former are Buckeye engines connected to General Electric generators, while the smaller unit is driven by a B. F. Sturtevant vertical engine. The latter unit is expected to provide current for lighting the towns, mine and mine buildings and driving the pumps.

Current is generated at 2300 volts and suitable transformers provided near the tipple and at the mine where needed. All equipment is motor driven with the exception of the box-car loaders, which are operated by engines. For the main-haulage and coal-cutting machines three motor-generator sets have been installed, each delivering 100 kw. at 250 volts. Direct current is used inside the mine. The mine fans are also driven by direct-current motors, so that the amount of air furnished may be regulated to amply meet all requirements but prevent undue absorption of moisture. Fifteen-ton haulage locomotives are used on the main haulageways, 6-ton gathering locomotives being employed to bring the cars from the rooms.



THE POWER PLANT AND TIPPLE SPANNING RAILROAD TRACKS

GOOD HOUSES, WATER SUPPLY AND SEWERAGE SYSTEM

The water supply for the plant is obtained from a large spring, located about one and a half miles up Spring Cañon from the tipple. The flow from this source is more than ample to care for the present requirements of the plant. Gravity supply is obtained at the boiler house, while a pump house located about midway between the tipple and mine to which the water flows supplies the town and provides for the sprinkling system underground. Two 5x6-in. vertical single-acting triplex electric pumps equipped with automatic compensator and float switch are installed in this pump house.

The miners' houses are exceptionally good, being built of stone and made strictly modern throughout, containing four rooms exclusive of the bath room.

A good sewerage system has been laid and all houses are connected thereto. Two settling tanks have been built for the purification of this sewarage. Satisfactory results are being obtained from this system of purification, the discharge being clear and odorless.

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A Big Western Coal Consolidation

The *Boston News Bureau* says under date of July 3:

Plans for extensive coal development in Colorado fields are on foot. By their consummation 30,000 acres of Routt County coal lands will be taken over by a combination of Belgian and Paris capitalists. Five Paris banking concerns and coal kings of Belgium are said to be interested. These include Prince Henri de Croy, a member of the ruling house of Belgium, and Camille Peria and W. J. van Maanen, representing French and Belgian capitalists. A. R. Bickerstaff, of Consolidated Securities Co., of Toronto, Can., and Benjamin L. Dorsey, have taken over the coal lands. Foreign moneys will purchase $28,000,000 worth of bonds in Yampa Fuel & Iron Co., and Colorado & Northern R.R.

President Dorsey, of Yampa Fuel & Iron Co., says: "We have ironbound contracts with the bankers of the French and Belgian capitalists providing for sale of the $28,000,000 of bonds, as soon as they have been shown that the properties in Routt County are as represented."

Denver newspapers say that there will be an initial expenditure of $22,000,000 in Colorado and Wyoming. A railroad is projected from Hayden, Colo., to Casper, Wyo. It will be known as the Colorado & Northern Ry., and will extend from Hayden on the Moffat road through the Routt County coal lands to Hahns Peak, a copper and placer mining district. It is expected to lead to the reopening of old copper mines and the revival of the placer-mining industry in that section. It is projected thence through the copper fields of the Bartle Lake district to Walcott, Wyo., 16 miles. There it will intersect the main line of the Union Pacific Ry., thereby furnishing transportation facilities for the coal East and West.

From Walcott the railroad would extend to Caspar, Wyo., connecting with the Chicago & North Western and Burlington lines. These connections will afford facilities for placing Colorado coal in the Northeast as far as St. Paul and Minneapolis, and Puget sound in the Northwest, equal to nearly a third of the United States. The plans call for 210 miles of new road.

The first section of the road it is ascertained will be completed within a year.

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Explosives transported on mine cars should be kept off the floor and away from iron fittings, as such fixtures are apt to be affected by currents from the drawbars if the rails are slippery and sand is used to overcome slipping.

Solutions of Two Gasoline-Motor Problems

By R. O. Hodges*

SYNOPSIS—The two most apparent objections to the gasoline motor are that the oil may explode and that the exhaust is liable to befoul the mine air. The evidence of all past experience shows these difficulties are not hard to meet, and the author believes they should not act as a bar to the further use and development of gasoline motors.

There are two dangers from the gasoline mine motor which have been much exploited, and which are, of course, present in some degree. The first danger is that of fire. At first sight it seems like insanity to take any quantity of such an inflammable material as gasoline into a mine. We believe, however, that we have so surrounded the transportation of the gasoline with safeguards that we have reduced this danger to a minimum, and that with reasonable attention the possibility of fire need hardly be considered.

In our system the gasoline is always handled in sealed tanks. These are filled in the oil house, carried to and installed on the motor; and after they are once in place, it is impossible to get any gasoline into them without removing them from the motor. The tanks are of extremely heavy and durable construction, and while it is not safe to say that they cannot be punctured, yet only as a result of gross carelessness could the gasoline escape from the tanks. We have a valve in the gasoline reservoir itself and another in the pipe line, so that the operator can shut off the gasoline supply at two points well removed from each other. The tanks are placed under heavy covers, so near the center of the motor that severe accidents can occur without causing the gasoline to escape.

Accidents to Motors Which Have Not Caused Explosions

We sent a motor to the experimental mine at Bruceton, Penn., and before the experts of the bureau knew as much about explosions in the mines as they do now, they set this motor, with a full gasoline tank, out in front of the mouth of the mine, with a coal car just behind it. They put a little red flag on the motor with the idea that when the explosion occurred, they might be able to see the flag wave. Nobody ever knew what happened to that flag, but the coal car with its load was blown over the top of the motor and 250 ft. beyond, ceasing to travel only when it struck the opposite hillside. The explosion also blew the metal covers from the top of the motor, but did not cause any gasoline to leak, nor did it damage the gasoline tank in any other manner.

At a mine in central Pennsylvania two of these motors met head on, one of them having 25 loads behind it and the other 25 empties. One motor had both side frames badly smashed and the bumper was broken into half a dozen pieces. On this motor the engine was heard to continue running for an hour or more after the wreck occurred; in fact, it continued its revolutions until the gasoline was exhausted. The other motor had the top entirely torn off, but the gasoline tank was not punctured, though it was torn from its fastenings, and about half a tankful of the gasoline escaped in about an 1/8-in. stream. We have since arranged the fastenings on the tops of our motors, so that in a future case probably not even this can happen. However, the officials at the mine had the possibility of a fire in mind when they approached the disaster, and they used safety lamps and moved with care and precaution, as is essential in all cases where gasoline motors are wrecked. In West Virginia two of our motors collided, and though the bumpers were badly broken and the side frames sprung, no gasoline escaped from either motor.

The Gasoline Pipe Breaks and the Oil Ignites without Injury

In a West Virginia mine the gasoline pipe of a motor broke and the motorman ignited the oil with his lamp. He became frightened and ran away from the motor. Everybody about the mine was desperately afraid that the motor might blow up at any minute, and they would not go near it. The fire, fed by gasoline from the tank, kept on burning for about an hour, the feed pipe being so small that it only supplied enough gasoline to keep a good blaze at the back end near the carburetor. This fire burned the insulation off the magneto, cables, etc., but as it did not get near the gasoline tank, the latter did not blow up and the men finally put some sand on the blaze and extinguished it. Though the fire destroyed the magneto, carburetor and cables, it did no other damage of any kind.

The Gases in the Exhaust

Many analyses have been made of the exhaust gases from gasoline motors. These gases consist of nitrogen, which, of course, is inert in combustion; carbon dioxide, CO_2, sometimes, but incorrectly called black damp; carbon monoxide, CO, or white damp; oxygen, hydrogen and water vapor.

Gasoline vapor in the exhaust gases is difficult to detect by chemical analyses. I am inclined to think that the reason for this is that the unburned gasoline, as soon as it strikes the air, and cools to atmospheric temperature, condenses into a liquid and falls to the bottom of the bottle in which the sample is taken or else to the ground. In order to obtain the worst possible conditions of operation, the motor was sometimes purposely thrown out of adjustment, and then there were undoubtedly small proportions of unburned gasoline in the exhaust. So small, however, do these appear to have been that chemists have not gone to the great trouble necessary to ascertain them.

Carbon dioxide is a suffocative gas, but possesses no poisonous quality. In quantities such as given off by the gasoline mine motor, its effect on the ventilation of the mine is practically negligible. Of course, water vapor, or steam, in such minute quantities as furnished by a gasoline locomotive, does no harm in a mine, and in many cases may do some good.

The only dangerous constituent of the exhaust is the

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Note—Second installment of article read before West Virginia Coal Mining Institute, June 24, 1913, at Morgantown, W. Va., entitled "Gasoline Motor Haulage in Mines." The first installment appeared July 19, Vol. 4, p. 90. The consideration of the motor as a machine will appear next week.

carbon monoxide. One-tenth of 1% of this gas is decidedly dangerous, if a human being is exposed to it for a long time. We, therefore, have to consider the exhaust gases of the motor as being dangerous in direct proportion to the extent to which they contain carbon monoxide. This gas is never present in the exhaust from a motor when complete combustion has taken place in the cylinder, and its presence is an immediate evidence of incomplete combustion. Therefore, we can render the exhaust gases from these motors innocuous in direct proportion to the extent to which we can gain complete combustion.

How Complete Combustion Is Assured

We have gone as far as we can in this direction by making our combustion chambers at the end of the cylinder as nearly of a hemispherical shape as we can, by increasing the compression to the highest possible point in order to make the heat of the explosion as great as possible and by providing a carburetor with a single adjustment which is readily understood and which can be varied easily by the motorman as the changing conditions of the atmosphere indicate. We have used, moreover, abnormally large engines the power of which is greatly in excess of that needed for the actual work of the motor, with the idea of using the leanest possible mixture, and thus decreasing the liability to incomplete combustion.

I was privileged to witness one of the tests at Bruceton on one of our motors, in which the engine was purposely thrown out of adjustment, so that it was giving off a heavy, black smoke. A section of entry 9 ft. wide and about 6 ft. high, and I think about 1000 ft. long, was bratticed off with double brattice cloths so that no air could enter or leave the space inclosed. The motor was loaded with as great a load as it could haul when working in the inefficient manner purposely provided in the test, and was caused to run up and down for a space of about 500 ft. in this closed-off entry. We had two canary birds in this inclosure during the test, and at the end of an hour's running, under these conditions, the birds had fallen to the bottom of the cage but were still moving around, and showed only slight distress. They were far from being dead; so that the air was still quite fit to support human life for a reasonable period.

No Absorbent for Carbon Monoxide

I believe there is no known solvent for carbon monoxide except a solution of cuprous chloride, and this chemical is too expensive and inefficient to be considered for a moment in connection with a mine motor. A solution of slaked lime will have some effect in dissolving the carbon dioxide and will most markedly reduce the odors from the exhaust of the locomotive. We, in common with others, in our first experience with these motors, passed the exhaust through a solution of slaked lime, with the idea that in removing the odor from the exhaust we had removed its injurious elements. We were led to abandon the lime tank by discovering that after a short time the lime became heated and the odors from it were worse than the direct odors from the exhaust; wherein we "builded better than we knew."

As I have indicated above, the presence of carbon monoxide in the exhaust in dangerous quantities, is in every case indicated by smoke and also by considerable odor. The lime tank removed this smoke and odor, but did not remove the poisonous carbon monoxide. Therefore, in using the lime, we were merely removing the only index which the operator had whereby he could tell whether his motor was giving off poisonous gases.

There is no treatment which is commercially possible, which can be given to the gases from an internal-combustion motor which can make them less injurious. Strict attention, however, to high compression, ample engine size, perfect and easily understood carburation, and complete ignition will reduce the poisonous elements in the exhaust gases to such a low point as to make the motor, in any reasonable current of air, absolutely innocuous.

The Gasoline Motor in the Presence of Gas

I will not say that the gasoline mine motor is absolutely sparkless. It is possible to conceive of conditions under which there will be quite a decided spark, or even a short flame, from certain parts of the motor. These conditions, however, are invariably caused by neglect and abuse of the motor and are not present when the locomotive is running properly or has not been broken in some of its essential parts. Even if the motor should make sparks or a flame owing to neglect or abuse, these will occur near the rail and are, therefore, less likely to ignite methane than sparks from the trolley wire.

The gasoline motor, therefore, is safer than the electric locomotive, and is nearly as safe as the compressed-air motor for use in gaseous mines. Our company has consistently avoided installing these motors in workings where we knew there was a large quantity of explosive gas. This was, however, because we believed that it was not good policy to antagonize the mine authorities by placing a new machine in places which they believed to be unsuited. We felt they would soon become accustomed to its use and would not oppose its introduction when they knew how favorably it compared with the electric locomotive. It was for this reason that we did not install the motor in such mines, and not because we believed it was dangerous under such conditions.

Coal Trade of Barcelona, Spain

The quantity of coal discharged in Barcelona, in 1912, according to the Daily Consular and Trade Reports, totaled 1,032,954 metric tons (1,138,315 short tons). Of the quantity stated, 649,351 metric tons came from Great Britain, 85,346 tons from Rotterdam, 8275 tons from Belgium, and 1832 tons from Philadelphia, the remainder being Asturian coal of Spanish production.

Much Coal Used in Coke Making

According to the U. S. Geological Survey, the quantity of coal used for coke making in the United States in 1912 was 65,485,801 short tons. The coke produced from this coal amounted to 43,916,834 short tons, valued at $111,523,336, besides large quantities of gas, tar, benzol, ammonia, etc., as byproducts from the 11,048,489 tons of coke produced in byproduct ovens.

Coal Age Index Is Ready

The index to Vol. 3 is ready for distribution and will be mailed under separate cover to each subscriber. Anyone not receiving the index may secure a copy free by sending us a postal-card request.

Proposed Method of Longwall Mining

By F. C. Cornet*

SYNOPSIS—Attention is drawn to some of the questions necessary to be considered before adopting the method of working a particular seam that will accomplish the most complete exhaustion of the coal and economy of working. Description of a method of longwall mining proposed for working the lower Kitanning seam, in the northern part of the state of West Virginia. The method contemplates the subdivision of the workings into panels to be worked on the retreating system, having due regard to the pitch of the seam so as to favor the movement of the loaded cars. Description of the method of systematic timbering at the longwall face, best adapted to the peculiar roof conditions in that seam.

In the opening of a new mine, it is of the utmost importance to adopt such a system of working as will be best adapted to the extraction of the particular seam considered. This question can only be decided successfully after a careful study of the conditions affecting the mining of the coal in any given locality. These conditions are made known by a close survey of the region and careful inspection of adjoining workings, supplemented by the experience of others in that locality and the knowledge gained by thoroughly prospecting the area.

Some of the important points to be considered in this preliminary work are as follows: The depth, thickness and inclination of the seam; the character of the coal and the overlying and underlying strata; the position and general direction of any fault lines that may exist in the strata; and the probable quantity of water that may be expected and which must be provided for in the operation of the mine. The question of haulage, drainage and ventilation of the mine, together with the general configuration of the surface, and the available shipping facilities will determine the best location for the shaft, slope or drift openings. The question of markets, competition with other coals and transportation and labor must be carefully exploited before the desired output of the mine can be determined.

After a careful study of existing conditions, I have come to the conclusion that the following proposed method of longwall mining on the panel system would be particularly adapted to the working of the Kitanning seam, in the northern part of this state. The seam varies in thickness from 6 to 7 ft. In studying this seam, I have observed many times that the pillared areas of a hundred feet or more in width by several hundred feet in length, stand open sometimes for a month with absolutely no support but the props that hold the roof-slate in place. In most cases, the majority of the props had to be knocked out by hand or destroyed by shooting before a fall of roof would take place. I feel confident that the method of timbering described, simple as it is, will be adequate in the working of this seam.

In the design of the system I am about to describe, I have had particular regard to the complete exhaustion of the coal in each panel, in the speediest and most economical manner possible. At the same time, the safety of the men and regularity of the work have been given full consideration; and these items alone have led me to subdivide the panels, which not only expedites the work, but provides more avenues for escape, in case of accident. As this seam yields practically no gob for filling purposes, the retreating system of longwall was the only one to be considered.

As will appear in the following description, the proposed method is a panel system, in which each panel is worked independently on the retreating-longwall system. As shown in Fig. 1, the system can be applied either to the working of a new mine or to extending the workings of a mine already opened on the room-and-pillar system. In Fig. 1 the old room-and-pillar workings are shown on the left. Following this to the right are panels *A*, *B* and *C*, in different stages of advancement. On the same principle, in Fig. 2, there are shown two other panels *M* and *N*. The first three panels, *A*, *B* and *C*, are worked in three subdivisions. Panel *M* is not subdivided, while panel *N* has two subdivisions only.

Fig. 1 shows how the longwall method, as applied to an old mine worked on the room-and-pillar system, can be made to succeed that system without affecting the daily output of the mine. The general plan is not altered, except that the cross-entries can then be driven a greater distance apart, say 500 ft. instead of 380 ft., as in the room-and-pillar system. By this means, the area of coal in each panel is increased 44 per cent.; and there is nothing to prevent driving the cross-entries at a still greater distance apart, so as to further increase the area of coal in each panel at a later stage of the development when so doing will not interfere with the regular daily output of the mine.

It will be observed that in Fig. 1 the length of the first section developed is 1200 ft. This is a favorable length in the present instance, because the West Virginia mining law provides that not more than 60 men shall be employed on a single split of air; and, in the system employed here, it is impracticable to divide the air current in each panel. A length of 1200 ft. will permit 60 men to work on a single face, allowing 20 ft. for each man.

Moreover, the output of 60 men ought to be sufficient to justify the employment of a first-class foreman in each panel. This man would act as a "face foreman," and would be able to travel this distance and visit every working place several times a day, which would enable him to see everything that was done in his panel or district, and afford him no excuse for neglecting or overlooking anything. A face longer than 1200 ft., with only 60 men employed on that split, would result in slow progress and the "weighting" of the roof would advance too close to the face of the coal and require the use of more timber than is necessary or advisable. Again, a face shorter than 1200 ft. would make the employment of a special foreman for each panel less economical, and might result in the foreman's jurisdiction being extended over two or more panels, which would cover too large an area to enable him to make a thorough inspection of each working place, which is so essential to safe working.

A single glance at Fig. 1 shows that the working face of a panel is to be started at the inner end and on the

*Mining, civil and mechanical engineer, Charleston, W. Va.

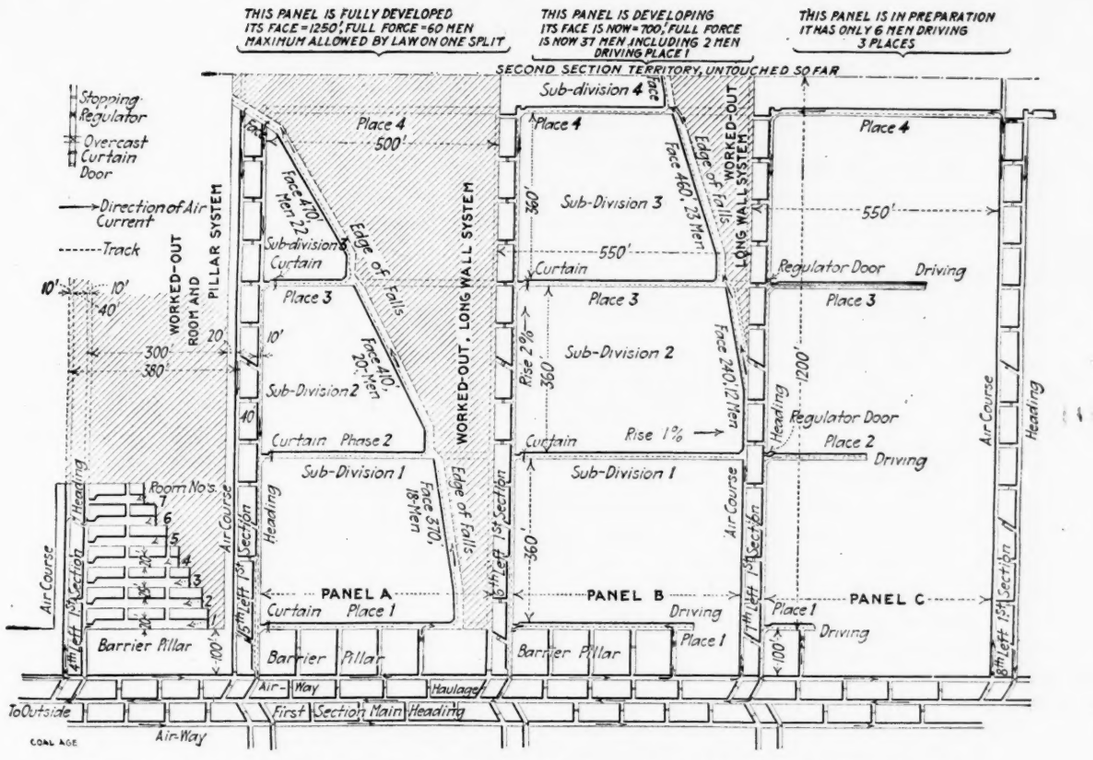


FIG. 1. A PROPOSED PLAN OF LONGWALL WORKED ON THE PANEL SYSTEM AND STARTED FROM ROOM-AND-PILLAR WORKINGS

lower rib of the air course above the panel. For example, the working face of the panel *A* was started at the inby end and on the lower rib of the sixth-left air course. In the same manner, the working face of panel *B* was started at the inby end and on the lower rib of the seventh-left air course. Before starting this working face, it was necessary to drive a place across the inby end of the panel, to the air course above, as shown in panel *C*. The air current is then split at this point; and, while the larger portion is made to ventilate the panel below, a small scale of air is carried up to ventilate the headings being driven in the next panel above. Regulators are placed, as they are needed, at the points indicated in the figure, so as to divide the air in proportion to the requirements.

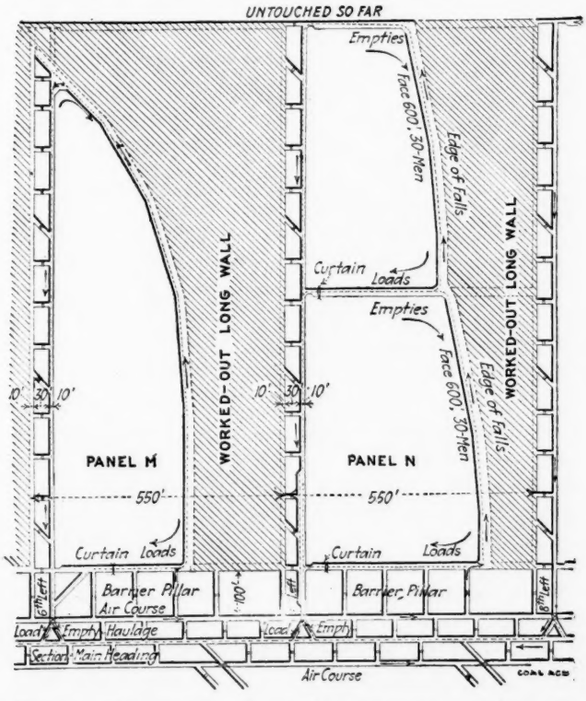


FIG. 2. SHOWING A LESS SUBDIVISION OF PANELS

The cross-heading at the inby end of the panel is driven wide enough to avoid the payment of yardage but no wider, in order to economize time. This heading is marked "Place 4" on the plan (Fig. 1). Following this, three other places are started in succession, outby on the same entry, thereby dividing the panel into three principal subdivisions. A barrier pillar 100 ft. wide is left flanking the main entries, which are driven triple to provide a main central haulage road and two intake air courses, one on each side of the haulway. As shown in the figure, the inby cross-heading (Place 4) is driven about 60 ft. from the boundary of the section, which saves the driving of the same distance of cross-entry, in each panel. As observed in panel *B*, the working face at the boundary line in each panel is 60 ft. ahead of the air, which is well within the 80-ft. limit allowed by the West Virginia mining law.

As shown in panel *C*, it is necessary to use a brattice to conduct the air current to the face when driving the cross-headings, all of which are driven wide enough to avoid the payment of yardage. The dotted line in each cross-heading and entry represents the track. The section of tracking along the working face must be shifted forward as the face is advanced. As indicated in the figure, the empties are taken up the cross-heading at the inby end of the panel or subdivision, in panels *M* and *N*; but, in panels *A*, *B* and *C*, the empties are taken up the

first cross-heading leading to each subdivision and along the face, on the same track by which the loads are run out. In this arrangement, the face track has one loose end in each subdivision and is more readily shifted as the working face is advanced than where both ends are fixed and must be disjointed before the track can be shifted, and then again coupled to the track in the headings.

I have shown one undivided panel *M* with 1200 ft. of face track, and panel *N* having two subdivisions and 600 ft. of face track in each. When the empties are taken in at one end of the track and run out at the other, as in these panels, it is necessary to arrange for turning the cars end for end, either on the tipple or on a reverse switch in the heading, so that the gate-end will run out first when the car is loaded. Of course, where a rotary dump is used the cars have no end-gates, and it makes no difference in which direction they are run.

In driving the cross-heading marked "Place 1," it will be unnecessary to use a brattice, since the barrier pillar can be crosscut every 80 ft., as shown in the figure, and these crosscuts can be used, at a later stage of the development, to ventilate the workings in that subdivision.

An important feature, where the seam has a practically uniform dip, is to drive the main-haulage roads in such a direction as to provide a grade of 1 or 1.5 per cent. in favor of the loaded cars. The direction of the cross-entries must also be such as to provide a suitable grade for haulage in favor of the loaded cars. In the present plan, the main entries are shown as having a grade of 1 per cent. and the cross-entries a grade of 2 per cent., in favor of the loaded cars. It is further necessary to arrange the line of working face in a direction that will favor the movement of the cars along the face. To do this, the face foreman must start the work at the inby end of each panel and push those places ahead most rapidly, starting other places, in succession, outby from these as the line of face advances, as shown in panel *B*. The plan of ventilation is clearly shown in Fig. 1, the intake air being conducted along the face, toward the rise at the inby end, where it is returned through the cross-entries and conducted by an overcast into the main-return entry, which is here made the haulage road.

In Fig. 3 is shown a detailed plan of subdivision 2, of panel *A*, Fig. 1. The plan shows a 400-ft. face, giving room for 20 men. A number of cars have been set in on the face track, and some of these have been distributed at the inby end of the subdivision, ready for loading. Three rows of props are shown set in rows parallel and perpendicular to the face. The props are stood 6 ft. apart in the rows, the rows being 6 ft., center to center; but the first row is 7½ ft. from the face.

In the same figure are shown four cross-sections, illustrating the different phases of the mining operations. The first of these (phase 1) shows the face ready for the shooters and loaders, a cut 6 ft. deep having been made in the coal, at the bottom of the seam. The car is shown standing on the track next to the face, and the three rows of props are indicated by *A*, *B* and *C*.

In the next phase, there are two cases. The first of these shows a new cut being made by a chain machine, after the coal has been loaded out and the place cleaned up. The track has not been shifted and cannot be until the machine is out of the way. This makes it impossible to set a new row of posts, and leaves an unsupported width of roof 13 ft. 6 in. wide. It is true that posts could be set temporarily, but these posts would have to be drawn to allow the shifting of the track later. This arrangement is not advised, and it is well to remember, in this connection, that the cut made by the machine increases, almost to that extent, the unsupported width of roof.

It is preferable to follow the plan shown in phase 2, where the tracks have been shifted immediately after the place was cleaned up, and a new row of posts set, as shown at *D*. The row of posts *A* have been drawn and the roof allowed to fall. In this case, the cutting machine is loaded on a truck running on the track, the cut being made in the coal, at a given height above the floor of the

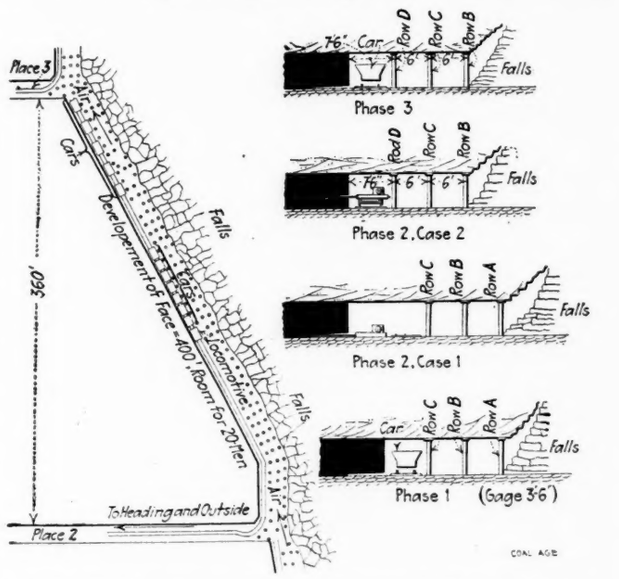


FIG. 3. DETAIL PLAN OF SUBDIVISION 2, PANEL A, AND CROSS-SECTIONS AT THE FACE

seam. Phase 3 shows the face in a similar condition to that shown in phase 1. The dotted lines here show the position of the cut when made by a machine.

The success of the work depends, in a large measure, on the regular and prompt setting and removal of props. The setting of a new row of props immediately after the track is shifted must be followed promptly by drawing the back row of props to allow the roof to fall. By using a machine for drawing the back timbers, as explained in an article on this subject, COAL AGE, Apr. 5, p. 529, it will be unnecessary for the timbermen to leave the protection of the other rows while drawing the back row of posts nearest the fall. No props must be left standing, even though they may not be good enough to use again.

Fire Protection of Headframes

The wooden headframe of one of the shafts of the Diergardt mine in Germany is protected from fire by a sprinkling system noted in the "Zeitschrift für das Berg- Hütten- und Salinenwesen," Vol. 61, No. 1. A pipe of 1-in. inside diameter leads to the headframe from two small boiler-feed pumps of about 2300 gal. per min. duty each. At 5-ft. intervals over the drum stage, are distribution pipes with openings. The device can be operated by a valve in the piping on the ground landing.

West Virginia Operators Allege Conspiracy of Competitive States

The following is the authorized statement of the West Virginia Mining Association, of which Wm. N. Page is president, G. H. Caperton, treasurer, and Neil Robinson, secretary:

Conclusive evidence that the shooting at employees of the Ohley mine on Cabin Creek on the afternoon of July 7, in common with all the numerous other outrages of a similar character that have been perpetrated in the last 15 months, was part of a gigantic conspiracy between the operators in Illinois, Indiana, Ohio and western Pennsylvania and the United Mine Workers is to be found in the published proceedings of the conferences of these operators with representatives of the union. These proceedings are published by authority of the conference, so there can be no doubt of their authenticity.

The origin of this conspiracy as related in these official publications dates back to Jan. 28, 1898, when representatives of the operators and the miners signed a contract, Clause 8 of which reads as follows:

> That the United Mine Workers' Organization, a party to this contract, do hereby further agree to afford all possible protection to the trade and to the other parties hereto, against any unfair competition resulting from a failure to maintain scale.

In union parlance "unfair" means "nonunion." The only nonunion coal field competing with the four states mentioned is West Virginia. Therefore, Clause 8 meant that in exchange for increased wages and other concessions elsewhere provided for, the union undertook to prevent West Virginia from becoming an effective competitor of the four states.

At every one of the conferences since then, the operators have urged the union to fulfill its contract by unionizing West Virginia, and the union has always assured the operators that it was doing its best. The discussions on this subject are reported verbatim in the proceedings published by authority of the conference. A few excerpts will show the character of these discussions. On page 17 of the official report of the conference of 1910 will be found the following remarks by C. E. Maurer, an Ohio operator:

> The granting of the 8-hr. day by the operators, after making these numerous other important concessions, was with the distinct understanding and explicit promise of the miners to give to the operators of the four contracting states adequate protection against the competition of the unorganized fields. From year to year they have been called upon to fulfill their promise. The operators, parties to that agreement, at the time of its execution, felt that it was absolutely necessary to the safety of their investments that they be protected from the encroachments upon them by their competitors of the unorganized fields. We ask for the fulfillment of the pledge of 1898.

At the same conference John Green, of the United Mine Workers, said (page 29):

> The United Mine Workers of America have diligently and aggressively attempted to carry out the promise made in Chicago in 1898. They have done everything in their power to redeem any promise they may have made to organize West Virginia. Since 1898 our organization has at various times spent hundreds of thousands of dollars trying to unionize West Virginia. We have also sacrificed human life in the attempt to redeem that promise.

At the 1912 conference (page 274), H. L. Chapman, a mine operator from Ohio, said:

> When we met in Chicago in 1898 and re-established the interstate movement, the competition from the non-union fields was the element that entered into negotiations in the adoption of the scale that was made there. It was understood in that convention, although it was not mentioned in the agreement, that miners of the competitive fields of the four states were to bring the non-union field up to the price paid for mining in those states, and unless they secured the adoption of an 8-hr. day at the next convention the competitive fields were to be relieved of these burdens.

At the same meeting (page 245) John P. White, president of the United Mine Workers, said:

> We are as anxious to establish the organization in the West Virginia fields and the other non-union fields as the gentlemen on the other side of the house are to have us do so. But the operators there have been successful in defeating the aims and purposes of the United Mine Workers to a large extent, although no one can deny that under the various administrations of the organization every effort has been put forth to try to break down the conditions that are complained of here on the other side.

On p. 217 of the official report of the 1912 conference may be found the following remarks by Duncan McDonald, secretary-treasurer of the United Mine Workers of Illinois:

> We have had thousands of men go to the penitentiary for trying to establish our organization in West Virginia and other non-union fields, and not only have they gone to the penitentiary, but they have been beaten up and slaughtered. We have had men go to jail. We expect that more of us will go to jail. The penitentiary doors have no terrors for us, as far as that is concerned. And if putting two or three hundred of our men in jail will organize West Virginia we will send two or three hundred down. The chances are we will have to get busy with that situation shortly.

Men are not usually sent to the penitentiary unless they have been convicted of crime. The declaration by Mr. McDonald, therefore, that he expected two or three hundred union men to land in the penitentiary is equivalent to an admission that he and they contemplated the commission of crime on an extensive scale.

Less than a week after this blunt admission by Mr. McDonald the union men on the north side of the Kanawha, where there was no trouble of any kind, and where no demands had even been presented to the operators, began buying rifles at a certain store in Charleston for the significantly low price of $1.98. In a short time they had accumulated more than a thousand guns. Then regularly organized squads of armed union men were detailed to go, first to Paint Creek and then to Cabin Creek, where the shootings and other outrages promptly began and have continued at frequent intervals since.

COMING SOCIETY MEETINGS

Alabama Coal Operators' Association—This association will hold its annual meeting at Marvel, on July 26.

American Institute of Mining Engineers—This institute holds its next annual meeting at Butte, Mont., on Aug. 18 to 21, inclusive. Bradley Stoughton, 29 W. 39th St., New York City, is secretary.

National Conservation Exposition—Miners' Field Day, to be held under the auspices of the Tennessee Mine Foremens Association, with the coöperation of the Bureau of Mines and the American Red Cross, on Sept. 20, at Knoxville, Tenn.

International Geological Congress—The 12th session of this organization will meet, Aug. 7, at Toronto, Can. Address of Secretary, Victoria Memorial Museum, Ottawa, Can.

Kentucky Mining Institute First-Aid Meet—This meet will be held at Central City, Ky., on Labor Day, Sept. 1.

American Mine Safety Association—The second meeting of this society will be held at the Bureau of Mines, Pittsburgh, Sept. 22-24. H. M. Wilson, of the above address, is chairman of the organization.

American Mining Congress—This society meets for its 16th annual session at Philadelphia, Oct. 20-24; the secretary is J. F. Callbreath, who has opened quarters in the Land Title Building.

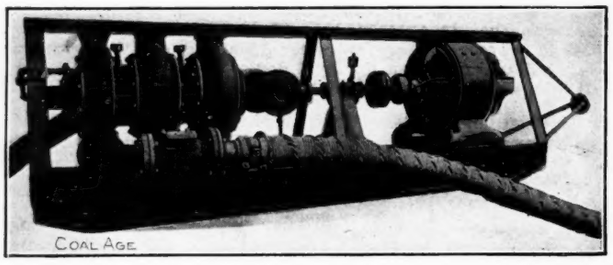
POWER DEPARTMENT

A Motor-Driven Mine Pump for Operation on Inclines

The accompanying illustration shows an interesting application of a motor-driven pump. It is designed for mine drainage and used on inclines up to 45 deg. from the horizontal.

The pump and motor are held together in a steel framework with an eye at the end to which a cable or rope is attached for lowering the outfit down the incline. The lower part of the framework acts as a skid.

Special arrangements had to be made for oiling the motor. The lubricating device for the lower bearing is



THE PUMP AND MOTOR ON SKIDS

seen between the coupling and the bearing housing; it is fed with oil from the upper end by means of a pipe.

The pump, made by the United Iron Works, San Francisco, is 4-in., three-stage, and operates at heads up to 250 ft. The motor has a capacity of 30 hp. and is of Westinghouse manufacture. Several pumps of this type are in operation and are said to be giving eminently satisfactory service.

An Induction Motor of New Design

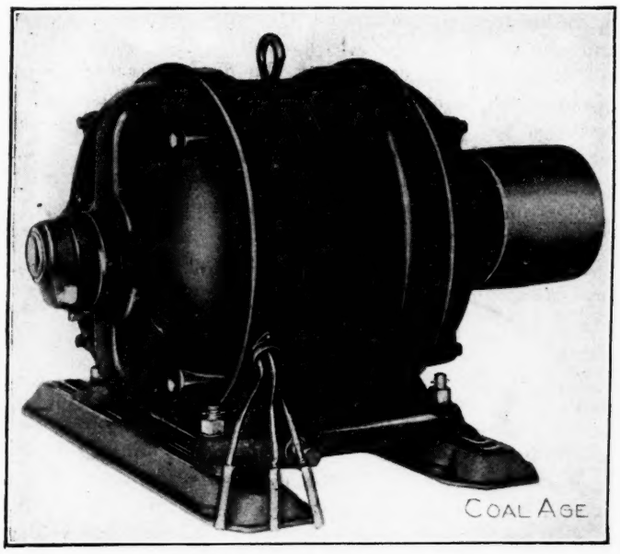
The new Westinghouse type CS squirrel-cage induction motors possess several noteworthy features. Among these are: The extensive use of pressed steel in their construction; rotors with cast-on short-circuiting rings, and moisture and heat-resisting insulation.

The use of pressed steel in motor construction represents a marked advance in design. It imparts great mechanical strength and is uniform in structure. Hence a motor of a given weight can be made with more active material than motors of corresponding capacity in cast-iron frames.

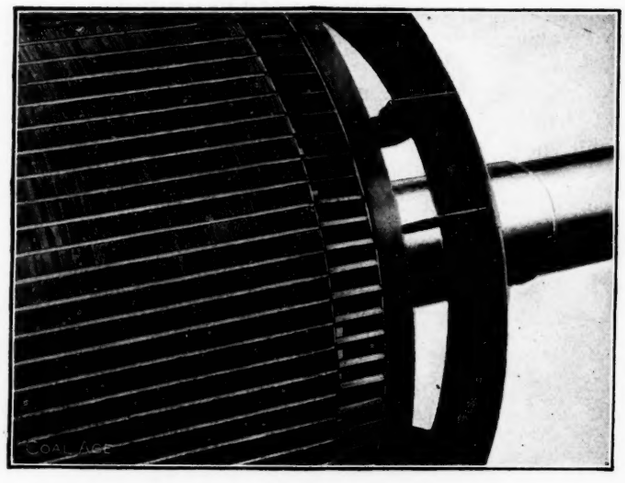
In these motors, rolled steel forms the frames of the sizes above 20 hp., the end plates of the smaller machines (which are of the so called frameless type), and the slide rails of all sizes. As a result these motors are compact.

Above 5 hp., the form-wound stator coils are laid in open slots, and repairs in case of accident can be readily made.

In all sizes, the rotor bars are insulated with a special cement which is moisture resisting and will withstand a high degree of heat and mechanical stress. In motors above 15 hp., the bars are connected electrically and mechanically by casting the short-circuiting rings around their ends. Hence these rotors, having nothing that can



A COMPLETE SMALL-SIZED MOTOR



END OF ROTOR, SHOWING CAST-ON SHORT-CIRCUITING RINGS

burn out, deteriorate under heat, or work loose under vibration, are practically indestructible.

The bearings, being the only wearing part, have been designed liberally. They are protected from dust by a cap on the front end and by felt washers between metal rings on the pulley end.

The efficiency and power factor are high, not only at full loads, but at fractional loads also. This last feature is of special importance because industrial motors generally run at less than full load.

Proper Installation of Alternators

By C. A. Tupper*

SYNOPSIS—The principal differences in the construction of alternators, which bear directly upon the methods employed in installation, are here enumerated together with the successive steps to be taken in setting up the machine and making it ready for successful operation.

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Before any alternator can be placed in successful operation, there are certain conditions of installation that must be carefully met, and which it is extremely important to observe if satisfactory results are to be secured.

The location of each generator is usually fixed by the position it must occupy relative to the prime mover or shafting by which it is driven. There is, therefore, but little choice as to location, but it is always desirable to so place alternators, or in fact, any electrical machinery, that they will be in clean, dry surroundings, where there is plenty of light and as much room as possible. Good ventilation is also important, since the better the circulation of air, the lower will be the operating temperature of the machine.

There should be no combustible material near the alternator, and sufficient headroom should be provided to permit taking the machine apart, if necessary. The best method of bringing in the various parts and putting them in position will depend largely on the size of the machine, the location in which it is placed and the handling facilities available.

If a traveling crane is at hand, the work is comparatively simple, but if temporary hoisting appliances, blocking, rigging, etc., must be depended upon, the method of handling must be suited to the conditions under which the machine is installed. Where no crane is available, a horse or derrick, made of heavy timber, and of sufficient size to hoist the parts of the machine into place by means of a chain block, should be provided.

Foundations Should Be Large and Solid

In order to prevent vibration and secure smooth running, the foundation on which an alternator rests should be firm and substantial. Small, belted machines below 100-kw. capacity can, if necessary, be set upon timber supports or mudsills, but a concrete or masonry foundation is to be recommended wherever possible. All machines above 100-kw. capacity should be provided with concrete, brick or masonry foundations, concrete being the most suitable.

A good concrete for generator foundations may be composed of one part portland cement, two parts sharp, clean sand, and four to five parts of broken stone, all proportions by bulk and not by weight. These quantities may be varied somewhat, depending principally upon the size of the broken stone, and the consequent percentage of voids.

The foundation should be sufficiently large and heavy to secure freedom from vibration and settlement. Foundation bolts for securing the base rails or sole plates of the machine, are best set by means of a template. In order to allow for slight adjustments in the position of these foundation bolts, it is a good plan to place either wooden boxes or iron pipes, the internal dimensions of which should be at least two inches larger than the foundation bolts around these bolts at the top.

The length of these pipes or boxes will depend somewhat upon the size of the bolts, but in general they should not be less than 12 in. long, nor ordinarily more than 24 in. long. Their tops should be so placed as to be from ½ in. to 1 in. below the surface of the finished foundation.

The top of the foundation should be leveled off as carefully as is convenient, but should be kept a short distance below the floor line or the bottom of the sole plate or other generator support in order to allow for leveling the latter, by means of wedges, and the concrete should be given a sufficient time for the cement to set before the machine is placed upon it.

The smaller belted machines, or those driven by waterwheels, are usually shipped completely assembled, with the stator yoke and bearings fastened to the base. In many cases, however, the stator is separate from the base, and in machines of larger diameter, particularly those of the engine type, it may be in two parts, being split horizontally.

With the engine type of alternator, the yoke either rests on an extension of the engine bed, as with some of the smaller machines coupled to a high-speed engine, or on sole plates set on suitable foundations. The stator sole plates for the larger machines are usually made in two parts, the lower one being bolted to the foundations, while the upper plate is adjustable to facilitate centering the stator with respect to the field.

How to Set Up the Machine

In setting up a machine of this type, the following are the steps to be taken:

(a) Locate the sole plates temporarily in position, and support them on iron wedges to allow for further adjustment.

(b) Place the lower half of the stator in position, and level it approximately with the leveling screws. In case this part of the machine is arranged to shift sideways on the base or sole plate, set it to one side so that it will be away from the rotor when the latter is placed in position.

(c) Place the revolving field and engine shaft in the bearings, making sure that the shaft is level and true with the rest of the apparatus. In case the engine shaft has not been pressed into the rotor spider at the factory, and it is necessary to do this work on the ground, a careful machinist should be employed, if possible. If no such mechanic is available, any person who can exercise care, caution and common sense can do the work.

(d) Place the top half of the yoke in position, first making sure that all planed surfaces are perfectly clean. Carefully center the stator, with respect to the field, by means of the adjusting screws, and measure the air gap between the stator face and the pole pieces at a number of points around the circumference; it is highly important to have the air gap uniform, as otherwise the frame will be subjected to an unbalanced, magnetic pull, causing bad operation.

On large waterwheel or engine-type alternators, where

*Milwaukee, Wis.

the stator is split, it is usually necessary, for convenience in shipping, to disconnect and remove a few of the stator coils at the two partings in the frame. These must be carefully put in place and properly connected. The insulation upon these coils should not be injured in any way, and all connections should be neatly made and insulated to correspond with those on the balance of the machine.

In aligning the yoke, the center of the armature laminations must be in line with the center of the pole laminations. If they are not thus lined up there will be a side or end thrust on the shaft.

After the yoke has been finally adjusted, shims are to be inserted between the upper and lower part of the sole plates, so as to take the weight off of the leveling screws. Drill and tap holes in the lower sole plate to receive the holding-down bolts for the stator, and bolt the latter securely in place.

(e) Grout in the sole plates, and after the cement has set, tighten down the foundation bolts and carefully check over the alignment of the entire machine.

If at any time the engine bearings are adjusted or realigned, the air gap between the stationary and revolving parts of the machine must be checked over and equalized. Otherwise, an uneven air gap will result, or the rotor may even rub upon the stator.

Either Insulate or Ground the Generator

Most engineers favor the insulation of generators from the ground, wherever it is possible. Such insulation is generally provided by a substantial wooden frame or by wooden stringers under the rails, the wood being well filled and varnished to prevent the absorption of moisture. This method is feasible with small generators, but with heavy machines, or those direct-connected to steam engines or waterwheels, complete insulation from the earth is practically impossible, and in such cases it is better to ground the frame positively by means of a heavy copper wire. In other words, the frame of a machine should be either thoroughly insulated or thoroughly grounded, so that there will be no doubt about its condition.

The method of setting up belted machines is as follows:

(a) The rails should be placed in position, approximately leveled, and wedged up so that the weight of the machine will be distributed evenly.

(b) If the alternator is small and comes completely assembled, it can now be set upon the rails, carefully leveled and lined up with the driving pulley.

(c) If the machine is of a large size, and is shipped in two or more parts, place the base on the rails and set the stator in position, first making sure that the planed surfaces on the base and feet of stator are perfectly clean and properly oiled to prevent rust. Most of the larger belted machines are arranged so that the stator can be shifted to one side, to give access to the field and armature coils, and, when the stator is first set on the base, it is advisable to locate it so that it will be to one side of the field when the latter is placed in position. All bearing surfaces should be thoroughly cleaned before the shaft is lowered into place. If there are any rough or rusty spots on the journals, they should be removed with crocus cloth or fine emery and polished. The oil wells also should be cleaned.

When placing the rotor in position, the oil rings should be watched carefully to see that they do not get jammed and bent out of shape. After the rotor has been placed, the caps of the bearing pedestals should be put in position and bolted down firmly. The stator can now be put into place over the rotor and bolted down.

If there are any dowel pins in the feet of the stator frame they should be put in place before the cap bolts are screwed down. The bearings may now be filled with a good quality of mineral oil to the proper height as indicated by the oil gages.

(d) Put the pulley on the shaft and line the whole machine from the driving pulley. If possible, run the generator with a slack belt and adjust the alignment while thus running so that the belt remains on the center of the pulley and allows the rotor to oscillate freely in its bearings.

(e) Tighten down the foundation bolts and grout in the rails. When the cement has partly set, the surplus may be removed and the joints smoothed up with a trowel.

When Machines Are Driven by Waterwheels

The foregoing regarding belted machines applies, for the most part, to those driven by waterwheels also, except that the latter have no rails and the base is set directly on the foundation. In this case, the machine must be lined up accurately with reference to the waterwheel, so that the halves of the flange coupling will fit exactly. After proper alignment by means of wedges, the foundation bolts should be tightened and the base well grouted.

In setting any generator, previous to grouting in, it is well to use plenty of wedges under both inside and outside edges of the base so as to give a firm and even support. In some cases, where alternators are of large diameters and run at low speed, no base is provided. In this instance, the stator and bearing pedestals rest on sole plates bolted to the foundation in the same manner as in the engine type of alternators.

With small alternators the collector rings are mounted in place on the shaft and connected to the field windings. On large machines, especially those of the engine type, the rings are usually shipped by the manufacturers separately, and, in large machines, both hub and rings are split so that they can be put in place after the rotor has been mounted in its bearings.

The collector rings should be fixed securely in position so as to run true and connected to the leads from the field windings, making sure that all contacts are clean and bolted up tight.

With large engine-type alternators and also with some of the larger waterwheel-driven machines, the brush-holders are supported by a stand bolted to the base or to a bridge fastened to the sole plate. On smaller machines the brush-holder studs are supported by the bearing pedestals.

The brushes should be carefully fitted to the collector rings. This can be done by first using coarse sand or garnet paper finishing with a finer grade. While shaping the brushes, the paper should be held well down on the rings so as not to wear away the edge of the brush. Care should be taken to see that the whole surface of the brush end makes contact with the ring and that the finger presses squarely upon the opposite end.

The brushes should be adjusted by changing the position of the tension spring on the arm and should be such

as to give a good contact on the ring. Too great a pressure improves the contact very little and causes excessive friction, wear and heating of the brushes and rings. Good judgment and careful attention will soon show the best pressure to be employed.

Preparations for Starting

The oil wells should be thoroughly cleaned before filling and the covers so placed that no foreign matter can drop into the bearings. When the machine is first started, it is advisable to draw off the oil at the end of each day's run, filling up with fresh until it is certain that all fine particles of grit or dirt have been washed out of the bearings. The oil thus drawn off may be filtered and used over again. It is advisable also to run slow for an hour or so and watch the bearings closely before attempting operation at full speed.

On account of not having a commutator, alternating-current generators are, generally speaking, easier to keep in good running order than direct-current machines. At the same time they must receive adequate and proper attention. It should be remembered that they frequently generate much higher voltages than direct-current dynamos, which renders it all the more necessary to keep them perfectly clean.

No dirt, copper or carbon dust should be allowed to accumulate on or near the windings, and, in plants sufficiently large to warrant the expense, it is advisable to install a compressed-air system so that all dirt can be blown out of the corners not otherwise easily reached. It is also advisable to give the armature coils and connections a coat of insulating varnish occasionally. In operation the collector rings should be kept lubricated with a small amount of vaseline or oil applied with a cloth, and the brushes should be so adjusted as to make good contact with the rings at all times.

Alternators in Operation

The field circuit should never be opened suddenly while current is flowing, but both main and field switches should be pulled when the machine is stopped.

Two machines should never be thrown in parallel when they are out of synchronism, as the excessive rush of current throws heavy strains on the engines and generators, and may cause considerable damage.

It should be remembered that alternators are designed for the voltage indicated on their nameplates. They cannot be expected to give potentials to any extent above normal with satisfactory performance of either exciter or alternator. Frequent attempts to raise the voltage an excessive amount have resulted in poor operation of both machines. Furthermore, the rated current output should not be continuously exceeded.

All bolts and nuts should be kept tight; electrical machinery should receive as much attention in this respect as steam engines, even though it is subjected to less vibration and stress. It is advisable to keep on hand at least one of each size of armature coils in case repairs are necessary. Also an extra set of brushes for both the generators and exciters.

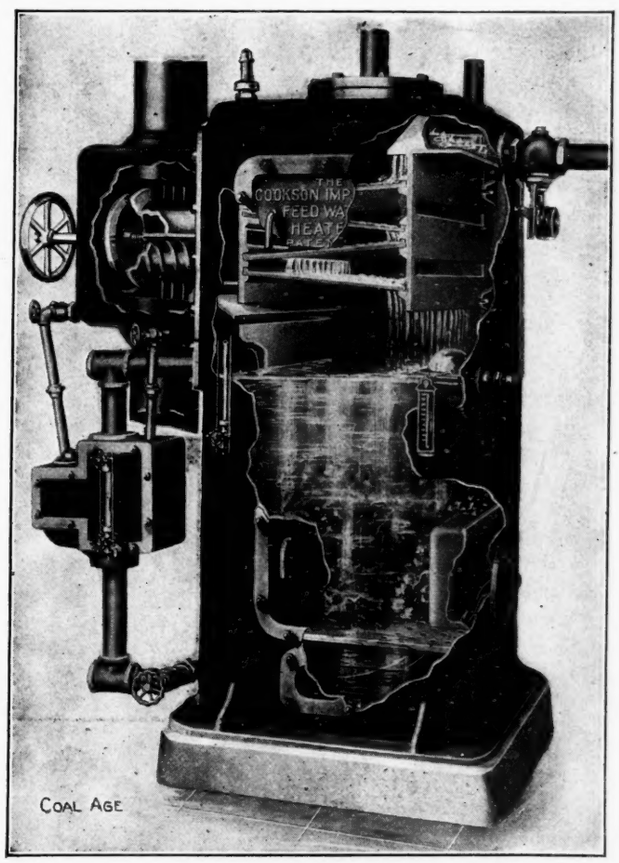
When machines are operating in parallel, and one is to be shut down, the load should first be reduced by throttling the engine or slackening the belt. The main switch should then be opened; resistance should next be cut into the field of the alternator to reduce the current therein. When this is done the field switch may be opened.

When a machine is run by itself, and is to be shut down, resistance should be first cut into the field of the alternator, thus lowering the voltage. The main switch can then be opened, and finally the field switch. The alternator field circuit should not be opened when full current is flowing, because the high induced voltage caused thereby may be sufficient to break down the field insulation.

In most large machines a grid resistance is connected to the field switch, so that in case the latter is opened the resistance is connected across the field circuit, thus forming a path through which the induced current can flow and prevent any abnormal rise in potential.

A New Feed-Water Heater

A new type of feed-water heater wherein the body is cast in one piece, giving greater strength, durability and a more handsome appearance, is being introduced by the



The Cookson Feed-Water Heater

Bates Machine Co., of Joliet, Ill., and is known as the Cookson one-piece heater.

The substitution of a single casting for the customary built-up plate body does away with bolts and calked joints at all points save the oil separator, the manhole and handhole covers and the pipe fittings. In other words, there is no chance for leakage at the points, which, in any built-up heater, are most apt to give trouble from this cause. It is evident, also, that the more solid construc-

tion is practically indestructible and capable of safely withstanding the greatest back pressure that will ever be built up within the heater. The safety valve may be set to blow off at 25 lb. per sq.in. without danger of leakage or bursting plates.

This heater has large steam space, tray surface and filtering space, and the four large manholes and handholes make cleaning easy. The cleaning doors are conveniently located in front and back, and as the heater may be made right or left handed by turning it halfway around, it will fit into the plant without complications to the piping.

The oil separator is made in either of two types: First, extra large and with cutout valve so that all the exhaust is purified. Thus, a surplus over feed-water heating requirements is in best possible condition for re-use in heating or processing systems, while the cutout valve permits shutting off the body of the heater for cleaning. Second, standard oil separator which permits piping to the heater on thoroughfare or inducion principles and assures splendid oil separation from as much exhaust as is required for feed-water heating.

A steam trap and return opening are provided so that the heater may receive the returns from a steam heating system or not as desired. The fittings throughout are high grade and the flanges are furnished to meet the customers' requirements.

September Meeting of the American Mine Safety Association

The annual meeting of the American Mine Safety Association composed of leading coal- and metal-mine operators, mining engineers, mine-safety engineers, and mine surgeons will be held in Pittsburgh, Penn., Sept. 22-24.

This association, which held its first meeting a year ago, has for its purpose a reduction of the number of accidents in the mines and quarries (3602 in the year 1911) and the alleviation of the sufferings of more than 60,000 men who are injured each year.

Following the recommendations of the Bureau of Mines in the last three or four years many mining companies have organized rescue corps and first-aid teams, and as a result a number of different methods of procedure following mine explosions and fires and in caring for the injured have developed. The men who gathered a year ago to form this association felt there was need for greater uniformity in the work of the rescue and first-aid crews, and at that time some important recommendations were made.

This second meeting which has been called by H. M. Wilson, of the Bureau of Mines, chairman of the executive committee of the association, promises to take up and discuss a number of the problems that have arisen in both the rescue and first-aid work. The members of the association declare that greater progress can be made in saving life and in reducing the seriousness of injuries by the adoption of the proposed standard methods.

Mr. Wilson, in discussing the association, said: "The object of the American Mine Safety Association is to promote the science of safety in mines and mining by the adoption of improved first-aid methods, and of logical modes of procedure in rescue and recovery work in mine disasters; to recommend the adoption of approved types of first-aid, mine-rescue and recovery appliances; to obtain and circulate information on these subjects; and to secure the coöperation of its members in establishing proper safeguards against loss of life and property from explosions, fires, or other causes.

The program will include a mine-rescue and first-aid contest at Arsenal Park on Sept. 22; in the evening a reception to the members and a motion-picture lecture on the mining industry.

On the second day the opening session of the association will be held in the morning and a report of the executive committee will be made on the proposed constitution of the society. In the afternoon there will be an explosion in the experimental mine at Bruceton, Penn., upon which occasion all members will be invited to be present.

On Sept. 24 there will be a business session and a selection of officers. In the afternoon members will visit the experiment station of the Bureau of Mines at 40th and Butler Sts., Pittsburgh, Penn.

The program in detail is as follows:

Sept. 22—	10:00 a.m.	Meeting of Executive Committee in Building 9. Bureau of Mines, 40th and Butler Sts.
	2:00 p.m.	Mine-rescue and first-aid contest, Arsenal Park, Pittsburgh.
	8:00 p.m	Reception of members by executive committee and motion-picture lecture on mining industry.
Sept. 23—	9:30 a.m.	Opening session of Association. Report of executive committee, action on constitution. Appointment of nominating and other committees.
	3:45 p.m.	Explosion in Experimental Mine, near Bruceton, Penn. Leave B. & O. depot, Smithfield and Water Sts., by special train. Explosion at 3:45 p.m., returning, arriving Pittsburgh 5 p.m.
	8:00 p.m.	Nomination and other committee meetings.
Sept. 24—	10:00 a.m.	Business session. Election of officers. Miscellaneous business. Adjournment.
	2:30 p.m.	Visit Experimental Station, Bureau of Mines, 40th and Butler Sts., and other points of interest.

OUTCROPPINGS

Every little mine has troubles of its own.

All Fools Day was probably made Apr. 1 because the labor agreements customarily expire on that day.

Advantage is a better soldier than rashness—a finger's length in a sword may determine the victor.

They might get King Nicholas, of Montenegro to settle the "button strikes" in the anthracite field.

Between the suffragette and the socialist the Government is having a busy time. Why not dispose of both by pitting one against the other?

Two libations of the liquor handled at an average mining-camp dispensary is guaranteed to make a canary bird sit up and spit in a bulldog's face.

We often discover what will do by finding out what will not do; and probably he who never made a mistake never made a discovery.

Those who measure up monthly yardage in coal mines should note that the London "Board of Trade" has found the standard yard to be two hundred and fifteen millionths of an inch short—another chance for the miners' union to kick.

EDITORIALS

West Virginia Labor Troubles

On page 123 we publish an authorized statement of the West Virginia Mining Association, claiming that operators and miners of competitive states incited the recent insurrections in the Southern fields.

The same statement has been made privately by West Virginia mine owners at various times in previous years when labor struggles have waxed hot, but never before, to our knowledge, has the charge of conspiracy been made on credited authority and in such a direct and public manner.

There is no doubt but that coal men in those states which have had to meet West Virginia competition have been greatly irritated by the success of their commercial rival in withstanding the encroachment of the miners' union. It is also easy to believe that these same operators in Pennsylvania, Ohio, Indiana and Illinois would be pleased to see the West Virginia fields thoroughly unionized. But is there anything unnatural or unlawful in such a desire? Do any of us delight in seeing our business rivals prosper at our expense?

Many times when strikes occurred in Pennsylvania, or one of the adjacent states, have the operators of the affected districts believed and stated that West Virginia owners were encouraging and aiding the miners? We are not prepared to vouch for the truth of these statements one way or the other. However, it is no secret that considerable ill-will exists between these two sets of coal owners. No one at all familiar with the situation is likely to believe that there is any fraternal bond between them. In fact this condition is one of the chief sources of weakness in the chain that binds the American coal industry together.

We are not convinced by the West Virginia charges of conspiracy. The indictment as a whole lacks force. The statement that the miners bought rifles in a Charleston store for the "significantly low price of $1.98" is nothing unusual. In the last few years, a large part of the 500,000 rifles the Government had on hand when the Krag-Jorgensen type of firearm was adopted has been sold at auction, bringing from 41c. to $2.50 each. They have been retailed all over the country at from 95c. up. Not long ago the Siegel-Cooper Co. in New York regularly disposed of them at 95c. each.

It is also true that during recent years various European governments have been pouring vast quantities of rifles into this country at extremely low prices. Francis Bannerman, 501 Broadway, catalogs a five-shot, 41-caliber Italian Veterli at $1.48. The price of $1.98 mentioned, therefore, signifies nothing except that the Charleston dealer made some money.

West Virginia mine owners are as decent and as capable as any body of coal men in America. The public press has hounded them unmercifully, and in a majority of cases unjustly. Space writers have fattened their monthly income by supplying columns of falsely colored matter calcuated to hold these operators up to the public gaze as heartless robber barons. Demagogues everywhere have added their cry to the popular clamor.

Through it all the West Virginia owners have fought stubbornly for what they believed was right. We have admired their determination, although disagreeing with much of their policy. However, we are sorry to see them designate the operators of other states as being the chief cause of their trouble. We can't trample our neighbor's lawn and then with propriety "holler" when he walks on *our* grass.

West Virginia operators have chosen to fight a bitter industrial war. They are standing out against a world-wide social advance, not a local disturbance comprising the employees of a few mines. So far, due principally to the physical nature of their country, they have been fairly successful in their resistance to the demands of organized labor. Some day they will be beaten, not so much because their principles are wrong, but because the forces against them are so great. In the meantime, the West Virginia coal owners should not forget that the rules of every game apply equally to both sides.

The Pension System

On June 7, we published a foreword on the pensioning of employees, a subject in which we are much interested. In it we referred to the "one dissenting voice of John A. Fitch," of the New York Survey, who regards the private pension system as a lariat flung over the head of labor.

It has been pointed out that Mr. Fitch does not stand alone in this view. We are not surprised at this; there are so many people in this smug world of ours who believe that any action of betterment by the employer is sinister and every neglect of improvement by him is a scandal. He is well chided both for doing and for failing to do.

An article in the *International Steam Engineer* in April, 1912, and another in the *American Economic Review* in June, 1913, both condemned the private pension. Moreover, Louis D. Brandeis in an article entitled, "The New Peonage; Discretionary Pensions" eloquently stated the same views.

Doubtless there were others, but we are entirely undismayed by any volume of condemnation. The facts are that a company which is willing to put a pension system in operation is usually not a gross oppressor. Three instances come to mind—the United States Steel Corporation and its many subsidiaries, the Pennsylvania R.R. Co. and the E. I. Dupont de Nemours Powder Co. These organizations all have pensions and are all noted for their fair and considerate dealings with their employees, for the mind that conceives a pension system is also able to plan other betterments, and can see the needs of humanity in a broad and sympathetic light.

The pensioning companies have to pay the scale and in addition contribute to the support of their workmen in their declining years. This they could only do under

two circumstances; either they must receive as a result a better service from their workmen or they must part with a percentage of their profit.

In the first instance, the satisfaction of the workingmen is necessary or the anticipated increased efficiency is not secured and how can there be satisfaction if the company acts in an arbitrary manner? The pensioning corporation is at a considerable disadvantage, begging the workingman to give him the efficiency which will permit it to fulfill its generous promises without a heavy loss.

If, however, there is no competition and the public must pay the cost of the pension scheme which the operator has chosen to put in force, then it is clear that the pension could as readily have been pocketed by the cirporation as handed to the workingman. If despite this fact the operator is willing to divide this profit with his employees, he is not likely to be niggardly and imperious in other matters.

In view of the growth of unions, it is safe to say that the unionized mining and railroad corporations have not even freedom to do right and certainly cannot contemplate the parlous pleasures of wrongdoing.

President Wilson Declares Himself

In the face of a nation-wide protest, President Wilson has signed the Sundry Civil bill carrying the "rider" which exempts labor organizations from prosecution under the anti-trust laws. That the measure is now a law is to be regretted. But this point loses importance before the more significant fact that the President has so clearly defined his policy in this respect. Nor was this done without mature reflection. The bill was in his hands for some time before his signature was attached and he must have had the subject in mind long before then, since it was returned to Congress for reconsideration by President Taft during his tenure in office. Furthermore the better classes have consistently opposed it and the press of the country has generally attacked it.*

Mr. Wilson explains—or rather excuses—his approval of the bill on the grounds that "other appropriations supply the Department with abundant funds to enforce the law." As a matter of fact there are already more than sufficient applications for the funds mentioned and it is highly improbable that any of them will ever be used for the purpose under consideration.

A singular and rather ominous coincident occurred in the signing of the bill. On the same day which this was announced a party of nonunion miners in Ohio were forcibly evicted from the works by a body of union men. Possibly it is the state's duty to protect its local industries, but with a labor party in control, we doubt if the operators will receive much consideration in this direction.

On the other hand, interference with the production of a commodity used in interstate commerce is clearly an infringement of the anti-trust laws and therefore subject to the action of the national Government. We fail to see as yet where organized labor has proved that only the unionist has a right to work, and it is to be hoped that the President will find a means of diverting a portion of the "abundant funds" at his disposal to prevent a recurrence of such instances.

*See "Coal Age," Vol. 3, page 693.

State Mining Laws

Probably at no time in the history of coal mining in this country have changes in the state mining laws been more numerous than at the present. We refer not only to those laws directly affecting the inspection of mines and the regulation of mining operations, but other laws of wider range and having for their ultimate purpose the establishment of greater harmony between mining interests of every nature.

The subject is a broad one and involves the safe and economical extraction of the coal, together with the transportation of the same to the various markets, and such a regulation of rates and facilities of shipment as will impose no burden beyond what is necessary in the several mining districts.

The matter of mine accidents is receiving special attention at the hands of legislators, and the great principle of due compensation to workmen injured in the performance of their duties is being patiently and, we believe, successfully worked out on a basis that will prove advantageous to employer and employee alike when unavoidable accidents occur.

In this connection, a suggestion comes from West Virginia where it has recently been put in practice, and which relates to making certain that every mine employee is or should be acquainted with the mining laws of the state. Recent copies of the mining law of West Virginia contain, on the reverse side of the perforated title page, a blank form of receipt, which is to be signed by the miner receiving a copy of the law, together with a copy of the rules and regulations governing the operation of the mines of the company by which he is employed. This receipt, signed by the employee and witness, is filed by the company, and is intended to forestall the claim of any employee, injured in the mine, that he was not acquainted with the law, mine regulations, or the particular danger to which he was exposed.

In reference to the printed copies of state mining laws, it is a good suggestion that these laws should be printed in small compact form of suitable size to be handled or carried about conveniently. A good size, which has been adopted by many mining states, is 3½x6 in., or 3x5½ in.

Photography at Coal Mines

Still another instance of the importance of photography at coal mines is the case of a recent accident in a large boiler plant. The breaching attached to a single boiler gave way and let the smokestack down on to the boiler-room floor. The report of the mishap was accompanied by three photographs; one showed the boiler as it looked after the accident, and the other views showed how the breechings on two boilers of other types were secured. These photos explained the cause of the accident, which, of course, was the result of bad designing. The photographic report was shown to the boiler manufacturers, giving them as good an idea of what the trouble was as if they had sent someone there to make a personal examination.

Photograph outfits at mines are, therefore, not only useful, but extremely economical. Such apparatus does not cost much and will repay the initial expenditure in a short time.

SOCIOLOGICAL DEPARTMENT

Two Safety Devices

By J. E. Jones*

SYNOPSIS—Two substitutes of human actions, which make the employment of men unnecessary. The lever of the switch stand is turned by the motor and not by a spragger. The hands of the trip-runner do not hold the coupling link, but a dog is used which is tripped into action at the very moment when the cars collide. As is usual, the devices combine economy of labor with safety in operation.

The automatic mine switch here illustrated is simple and can be made by a mine blacksmith. There is nothing which can get out of order and all accidents resulting from the making of a "flying switch" are thereby avoided. We have had a switch stand of this type installed at one of our mines where a Whitcomb gasoline motor is used for haulage and though it has been operated for several months, it has given no trouble during that time.

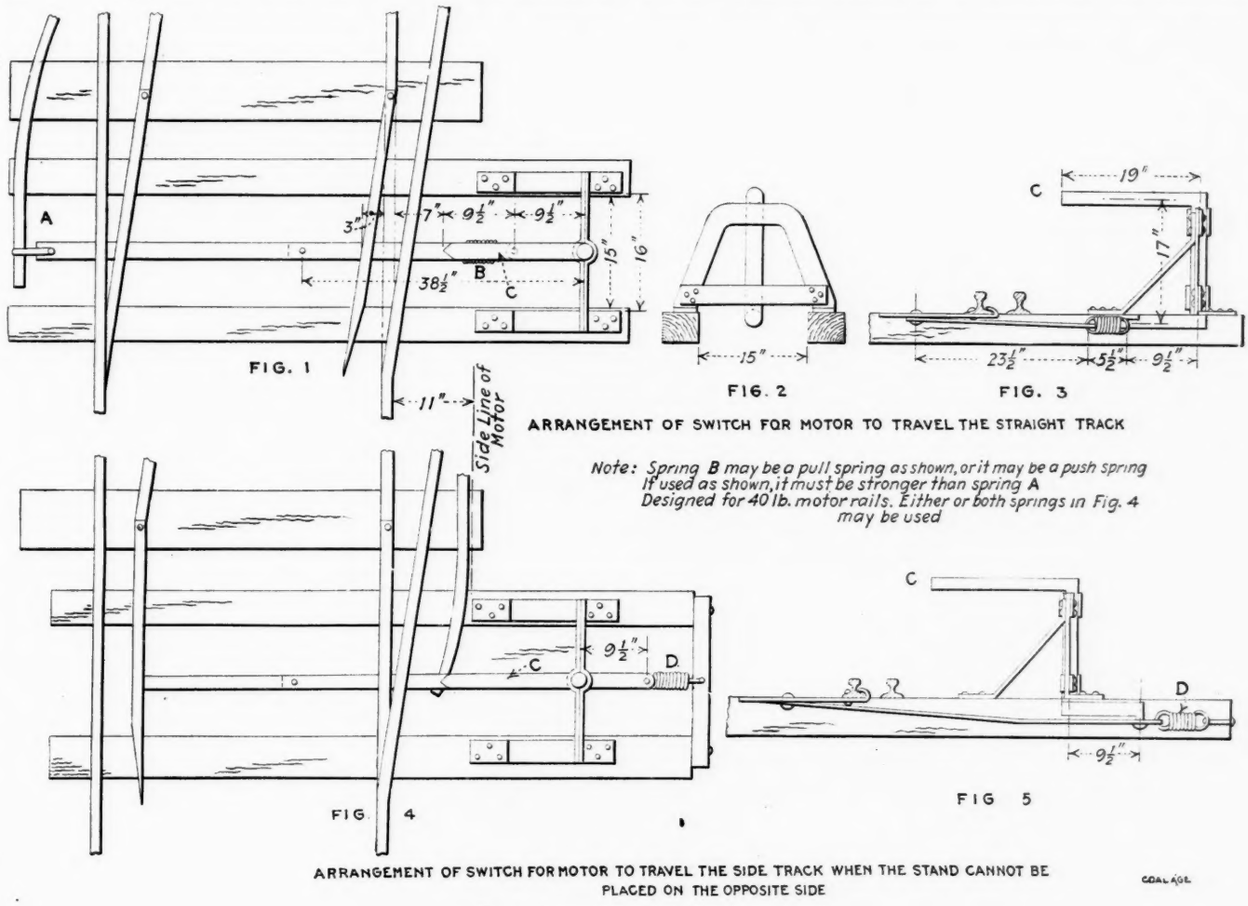
*Oak Hill Coal & Mining Co., 1914 McCormick Building, Chicago, Ill.

Switch Operated by the Motor

This mine switch is thrown in much the same manner as if operated by hand, but in this case the motor itself pushes the lever *C* and holds it in position till the locomotive passes over the points. These points are brought back into position after the motor has passed by means of a spring either such as is used on a common spring-latch, as *A*, or by a strong coil spring, such as *D*.

If a rail is used for a spring there should be a coil push-spring *B* in the connection between the stand and bridle to lessen the jar on the points, though this is not absolutely necessary. The parts of a switch of this kind must be made according to specific measurements so that there will be no unnecessary strain on the points or the stand. For the switch, here illustrated, the measurements were based upon a 38-in. gage and a point of contact between lever arm and motor 11 in. from the outside of the rail and 14 in. above it. The motor must be reasonably smooth on its sides or must be fitted with a strip of iron to hold the lever of the switch as the motor goes over the points.

In Fig. 1 it has been assumed that the locomotive



The Switch and Stand

always travels the straight track and in Fig. 4 the parting is arranged so that the motor passes onto the switch track and the cars follow the straight road. The stand is shown in this figure as placed on the same side of the track, though it could be removed to the other side. Owing to this change the points must be pushed over and not pulled. This kind of switch is only necessary where there are double tracks as at the shaft bottom, it not being wise to have the switch stand between the tracks. This automatic motor parting is especially adapted to making uphill "flying shunts."

Automatic Mine-Car Coupler

The second device is an automatic car coupler for which the mining industry has long felt an urgent need. It is strange that despite the long strides made in mining machinery that a device of this kind was not introduced long ago, especially since the railroad automatic coupler has been such a national success. The need for its introduction in the mines is hardly less apparent.

The coupler is simple, few in parts, and can be manufactured at a low cost. A successful mine-car coupler must embody the following principles. It must allow trips to pass around curves of short radius and it must not project beyond the extreme ends of the car. It must have sufficient slack so that the momentum of the moving cars at the front end of a trip may be utilized to start, one by one, the wagons which are not yet in motion. All these principles and other minor requirements are embodied in this coupler.

Detailed Description of Parts

The device is composed of three distinct parts; the coupler head, the hook and the three links. The head is a malleable casting so designed as to form a connection between the three links and the drawbar and also to serve as a seat for the trip or dog, on the action of which the automatic quality of the coupler depends. One of the links, that nearest the coupler head, is shaped like a D and is permanently attached to the head, which head fits over one end of the drawbar and is bolted to it by means of three bolts, one of these passing through the end belt of the car. The dog on which the big link rests ready for coupling is fastened to the coupler head by means of a pin upon which it is free to oscillate.

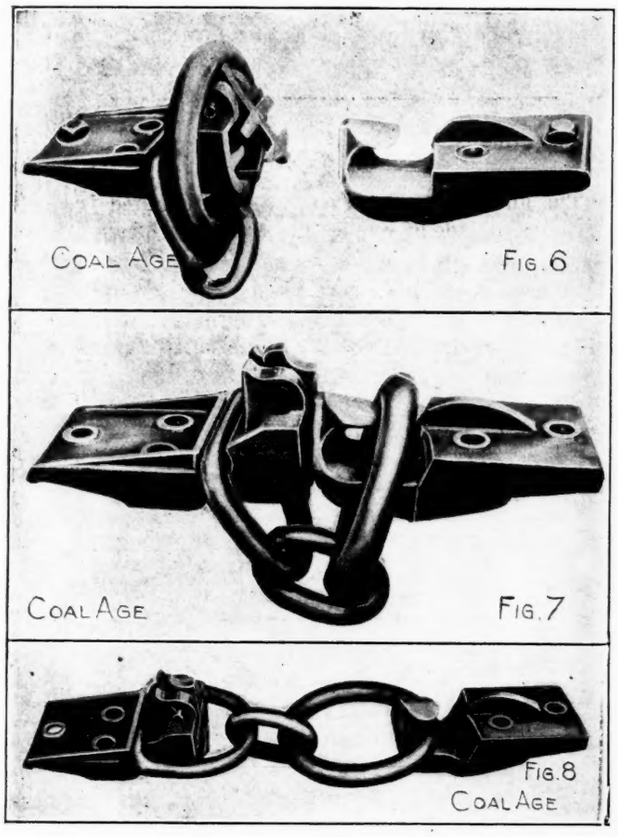
The hook is a malleable casting and is attached to the drawbar in a manner similar to the coupler head. This hook is designed to allow the big link to fall or slide into place when it is projected from head of the coupler by the oscillation of the dog. The form of the hook together with the leverage and weight of the big link make it practically impossible for the link to be thrown or jerked out of its position in the hook.

The three links are made of steel or of the best iron; the biggest is the coupling link which, when a trip is being made up, is hung on the dog at the top of the coupler head. The inside diameter of this link is 6 in., thus giving a play sufficient for all ordinary cars when on a reasonably straight track. The D link is slipped from the side into its groove in the coupler head. It is retained permanently in this position until a link is broken at which time the three links can be readily replaced. The small connecting link is roughly of an elliptical shape.

The Dog Which Replaces the Fingers of the Trip Runner

The dog is a malleable casting having a seat on the upper end for the big link and a projection to prevent that link from sliding back toward the car. The pin attachment passes through the dog at a point about one-third of its length from the upper end. The striking surface of the trigger end of the dog is increased by four side projections, two on each side at right angles to the motion of the cars.

The action of the coupler may be readily understood by reference to the accompanying figures. As the cars



Three Successive Positions of Coupler in Operation

come together the hook of one car collides with the trigger of the other immediately the upper part of the dog is thrown forward and the end of the big link is dropped over the hook and, as the cars separate, works itself snugly into position. The cars are uncoupled by lifting the links out of the hook when trip is slacked. The big links can be hung on the coupler head ready for recoupling or can be allowed to trail on the ground.

Saves both Labor and Lives

The person coupling with this device need not jeopardize his life by placing his head and shoulders between the mine wagons. Time is saved in coupling up a trip because all the cars can be prepared beforehand for automatic coupling by hanging the big links from their appropriate dogs. It is not necessary for a driver or trip-rider to climb back along the trip to couple on cars, and wagons need not be pushed apart to couple or uncouple

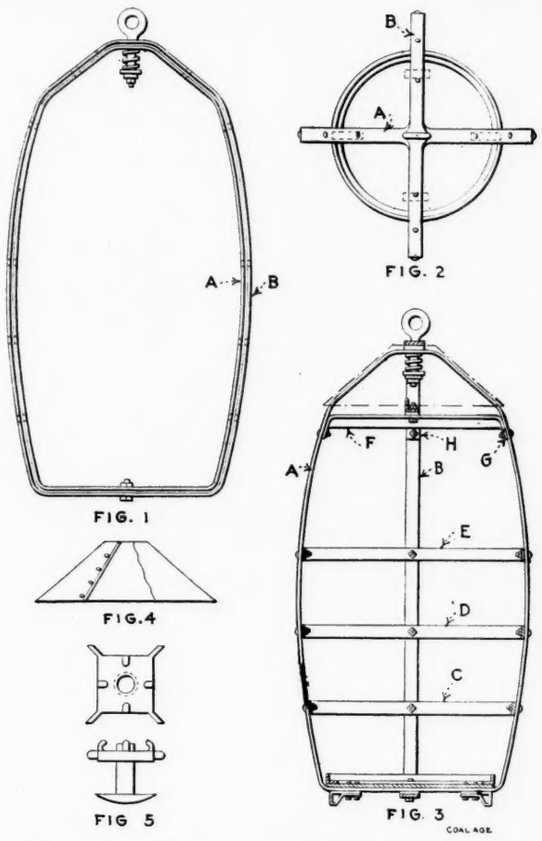
them. Coupler boys or men are not needed on partings or on the bottom. Thus not only labor but a cause of many accidents is eliminated. The weight of the castings for a 3-ton car is 17 lb.

No law has been passed requiring automatic couplers in mines, but it is likely that with their introduction will come legislation demanding that some such means be adopted to lessen the number of fatalities and injuries from mine cars.

An Emergency Cage

G. S. Rice, mining engineer of the Bureau of Mines, has invented a collapsible hoisting frame to be used in emergencies when the regular cage of a mine is injured so severely as not to be available, which often happens during an explosion.

This invention he patented June 3, 1913, the number being 1,063,285. The invention may be used by "any



DETAILS OF COLLAPSIBLE HOISTING FRAME

person in the United States without the payment of royalty."

As the inventor states:

It frequently happens in case of mine accidents that the regular hoisting equipment may be so damaged or disarranged that it cannot be used. In such case the provision of an emergency cage which can be made ready in a few minutes will greatly facilitate the work of rescue parties and aid in saving the lives of many to whom even a short delay may prove fatal. To be suited to this purpose the cage should be so constructed that it cannot be upset by striking projecting timbers or other obstructions in the shaft, and should as far as possible guide itself past such obstructions, since the men, if wearing rescue apparatus, cannot see readily nor control the movements of the conveyance used.

Such cage should be sufficiently strong to withstand any blows to which it may be subjected and should be so arranged that timbers and cloth for brattices or other supplies necessary for rescue work can be successfully lowered in it. It is especially important that the cage should be of such construction that it may be quickly assembled and readily taken apart again for the purpose of convenient storage and transportation, as it is often necessary to load these cages along with other rescue apparatus on railway cars not especially equipped for mine-rescue work. All of these varied requirements are met by the cage hereinafter described.

THE WHOLE CAGE IS COLLAPSIBLE

In the illustration of this device, Fig. 1 shows the collapsed cage consisting of two bales or yokes *A* and *B*, one of which is smaller than the other. They are connected at the top and bottom by pivot bolts. Thus the two bales can be swung into a position at right angles to each other as shown in Figs. 2 and 3, and secured rigidly by the hoops *C*, *D* and *E*, which are bolted to the bales. If desired a flexible hoop or chain could be used in place of hoop *E* to make entrance to the cage less difficult. A hood, Fig. 4, is dropped over the top of the cage fitting loosely as a cap over the suspending bales.

A cross brace consisting of two angle bars *F* and *G*, at right angles with flattened end-portions *H* and *I* and a pivoted connection at their intersection is bolted to the frame members near the top of the cage. These may be rotated when detached from the bales so as to lie one within the other, thus economizing space for shipment.

The platform is supported from contact with the ground by four lugs. The hood can be removed whenever it is desirable to lower timber. The king bolt by which the cage is supported is arranged to have a swiveling movement so that the twisting of the cable will not turn the cage. A spring on the king bolt relieves the strain on the rope when the cage is started upward.

BOLTS PROVIDED WITH WING NUTS

To facilitate the assembling of the cage a special form of bolt and nut illustrated in Fig. 5 may be employed. The heads of the bolts are rounded in order that they may not catch on obstacles in the shaft. The nuts are provided with wing projections which can be grasped by the hand like an ordinary wing nut or readily turned by a flat bar or like tool if a wrench should not be available. For the storage of these bolts and nuts when not in use a bag should be provided attached to some member of the cage so as to be always available when needed. Copies of the patent can be obtained from the Commissioner of Patents, Washington, D. C., by inclosing five cents.

Appointments in Iowa

Gov. Geo. W. Clark has just reappointed the present state mine inspectors for another term of four years, beginning July 1, 1913. They are J. E. Jeffreys, 1st District, Albia; R. T. Rhys, 2d District, Ottumwa; and Edward Sweeney, 3d District, Des Moines.

The members of the Iowa State Mining Board, appointed for one year, are: E. M. Gray, president, Des Moines; H. W. Ladd, secretary, Madrid; T. L. Evans, Lockman; David Anderson, Ottumwa; and W. L. Jones, Colfax.

Experiments have shown that the cartridges attached to rescue apparatus often become so hot when used, as to burn the skin of the wearer. This can be overcome by inserting a piece of asbestos between the cartridge and the skin.

DISCUSSION BY READERS

Mixed Lights in Mining

Letter No. 7.—Although not having the time to devote to the discussion of this subject that it deserves, I want to say that I do not believe in the use of mixed lights in a mine that generates inflammable gas in explosive quantities, even where there is a reasonably good ventilation. In mines of this character and where it is desired to obtain a better light than that given by the safety lamp, I believe the electric lamp recently approved by the Bureau of Mines, called the Ceag portable electric hand lamp, and the Hirsch portable electric cap lamp, can be substituted for the open lights, using the safety lamp for testing purposes only.

REES H. BEDDOW,
State Mine Inspector.

Gallup, N. M.

First-Aid Standardization

Referring to the article, "The First-Aid Muddle," COAL AGE, May 17, p. 769, permit me to express regret that the writer of the article deemed it unwise to disclose his name. In reply to my inquiry you state that he is a "physician of repute." Had the article appeared over the author's name, I can assure you that some of the eleven reputable mine physicians who prepared the report on first-aid methods would have been pleased to have answered the article.

I may add that the matters tentatively passed upon by these surgeons at the conference held in Pittsburgh last September have been under consideration by a committee of mine surgeons and physicians which was then appointed for this purpose. This committee will report at the first annual meeting of the American Mine Safety Association, which will be held in Pittsburgh beginning Sept. 22.

On behalf of that committee and of this association, I hope that in the meantime "A Physician" will either disclose his name or accept this as a general invitation extended to him by the association to be present, participate in its deliberations, and aid in perfecting standards of first aid, thereby contributing something constructive toward this most important work.

H. M. WILSON,
Chairman.

Pittsburgh, Penn.

An Open Letter

I have read with interest Mr. Powell's article entitled "A Gas Ignition Controversy," COAL AGE, June 28, p. 985; and, although the matter is not of sufficient public interest to discuss it further, it seems unaccountable that the numerous statements made in his article were not brought out earlier in the discussion. As superintendent of the mine, Mr. Powell had ample opportunities for making a thorough inspection of the mine before the inquest. It is worthy of note that he states (p. 987) that pillars Nos. 76, 77, 78 and 79 were being drawn on the day of the disaster; and men were at work in Nos. 80 and 81.

These points are of the utmost importance, because, if men were at work on the pillars here mentioned, there were undoubtedly explosives and detonators at those points, and a cache of explosives was found after the third disaster, at the fourth cross-pitch up No. 79 chute.

Admitting the truth of these facts, the probability is that a fall of roof, explosives, detonators and coal dust may all be considered as operating to cause the first, second and third disasters, in this mine; and, further, that the third disaster was assisted by the ignition of marsh gas accumulated on the pitch. It can now be stated with confidence that the Bellevue disasters of Oct. 31 and Dec. 9, 1910, were not gas explosions; but, in view of the facts to which I have referred, they were coal-dust ignitions caused by a fall of roof on explosives and detonators. These fresh facts further corroborate what I have always claimed, namely, that the two first disasters were in no sense gas explosions.

JAMES ASHWORTH,
Vancouver, B. C., Canada. Mining Engineer.

The Liquor Problem in Mining

Some time ago the question of the liquor problem in coal-mining communities was discussed in several articles (COAL AGE, Vol. 1, pp. 25, 56, 90, 192, 222 and 258) by C. L. Fay, then state secretary of the Y. M. C. A. mining work, in Pennsylvania. I should be glad to hear the opinions of men in charge of mines, on the effect and proper control of the drink habit among coal-mining employees. My observation leads me to believe that there is no doubt but that this habit has increased with the advance in wages, if not in proportion to the same.

There is no doubt but that the inebriety of coal miners affects not only themselves and those dependent on them, but is an absolute loss to the mine operators who employ them. Apparently, it is a difficult matter to control this habit where it has gained any ascendency. However, I believe that much could be accomplished if there was some general understanding in reference to the conditions under which employment would be given to applicants for work. Attention was drawn to this particular matter by H. D. Johnson, a firmer anthracite mine inspector, in discussing the miner's certificate situation (COAL AGE, Vol. 2, p. 467). Mr. Johnson, at that time, advanced the idea of the mine inspector granting three grades of certificates, A, B and C, to miners having different qualifications and capabilities. He claimed that these certificates should be presented by miners when making application for work to any mine foreman, and that it would enable the mine foreman to give them such work as they are capable of doing.

In addition to this idea, I want to suggest that the mine foreman or superintendent should demand of

every applicant for work a certificate of good behavior and sober habits, from his last employer. This certificate should state the time lost, if any, on account of drink. I believe that such a system would greatly improve conditions, and every step in this direction helps to increase the profits and place coal mining on a firmer basis.

A few years ago, a church holiday, a christening, birth, or death were the causes given for lost time; but now, all of these and numerous other insignificant causes, as, for example, a new litter of pups or kittens, arrival of a new calf, a youngster's birthday, etc., etc., are offered as sufficient excuse for idleness and drinking. A reference was made recently to the numerous holidays that interfered to so large an extent with the successful operation of a mine (COAL AGE, June 28, p. 994).

I believe if the shipment of intoxicants into dry territory could be prohibited, it would greatly help the situation, and to this end we should all lend our influence with the hope of bettering the conditions and the work.

SUBSCRIBER.

Pittsburgh, Penn.

Systematic Timbering

I have been very forcibly impressed by reading the resolution adopted by the Rocky Mountain Coal Mining Institute, at their recent meeting in Salt Lake City, as published in COAL AGE, July 5, p. 17. The resolution reads as follows:

> Resolved, that it is the sense of this meeting that any systematic method of timbering which contemplates the placing of the supports at regular intervals, is not applicable to the character of the roof overlying the coal measures in the Rocky Mountain regions, and that the only safe method is to require timbers to be set to securely support the roof in each individual working place. It is further resolved that this institute use all fair means to prevent or repeal any legislation which would attempt to establish systematic timbering in the several states in which the institute operates.

As the resolution was adopted after the discussion of D. J. Griffiths' paper, in which he made a special reference to the subject of systematic timbering, it would be of interest to those who, like myself, have not visited mines in the Rocky Mountain region, if Mr. Griffiths would further explain why systematic timbering is not adapted to that region and how falls of roof and sides are to be reduced in mines without a regular system of timbering.

From the brief reference Mr. Griffiths makes in his paper entitled "How to Reduce Falls from Roof and Sides," COAL AGE, July 12, p. 47, it seems to me he has not the proper idea of what is meant by systematic timbering. It is not altogether the fixing of props at certain specified distances apart; but it means the *minimum* number of props to be set at a certain *maximum* distance apart. The system provides that if more props are needed, they should be set, according to the judgment of the miner or the instructions of the mine official in charge. The system does not contemplate a hard-and-fast rule. It is generally agreed that any hard-and-fast rule in mining is impossible and dangerous. But, system in timbering, when adapted to the general conditions in a mine, makes mining safer by limiting the distance at which props may be placed apart. This distance is determined by the mine manager or foreman, who has the power to alter this distance according to the changing conditions in the mine.

I don't understand Mr. Griffiths' reasoning where he states that "to timber according to fixed rules, the standard of safe timbering would be lowered." As it seems to me, systematic timbering gives the mine manager and his officials a more efficient and effective control over this important work at the coal face than they could secure by any other means. When inspecting the roof, the foreman will still look for bad places between the props; but if the timbers are not set, the neglect would be detected at once.

In any other system of timbering, the miner commonly waits until the roof gives some indication, before setting a prop; and most miners take many chances under dangerous roofs. It is this that causes the large number of accidents at the face. On the other hand, where systematic timbering is adopted, the props must be set even if the roof gives no indication of needing such support. Where a systematic method of timbering the working face possesses a distinct advantage over any haphazard method is that it compels the miner to set a new row of timbers regularly as the face of the coal advances. He cannot neglect or postpone doing this because he thinks it is not required at the present time. If his timbers are farther apart than the maximum distance allowed, or farther from the face of the coal and an accident should occur, the man himself is alone responsible and cannot recover under any mining act.

I do not advocate being tied down to rules adopted in particular localities. For example, in France and Belgium, they nick into the face coal, at the roof, to make places for the cap-pieces and set the posts close to the face of the coal. In South Wales, the general rule is to set the props in diamond fashion, the posts in each alternate row being opposite each other.

In every case, the system used should be adapted to the particular conditions in the mine. It is reasonable to assume that it is safer to work by a *system* than in a haphazard manner. In sections where systematic timbering is carried on, the number of accidents has been reduced not only because more attention is paid to the roof under such system; but particularly because more attention has been paid to secure the roof in a systematic way.

I consider that the Rocky Mountain Coal Mining Institute made a mistake to pass such a resolution, even though systematic timbering would not benefit them. In view of the fact that the majority of mine accidents are due to falls of roof and coal at the working face, it should be our constant endeavor to adopt such methods as will tend to reduce, as far as possible, the number of these accidents. The resolution tends to weaken the confidence of those who are adopting a systematic method of timbering.

There is danger in assuming that any experienced miner will always timber his place in a proper manner when he is left to do this in a haphazard way, using his own time and judgment in performing the work. Where such practice is followed, the work of timbering is generally done after the box is loaded, and this too often proves to be a fatal mistake.

W. L. MORGAN,
State Mine Inspector, 8th District.

East St. Louis, Ill.

Fires—A Warning

I have been much impressed recently with the large number of fires that have occurred within the last few months, as recorded in the news columns of COAL AGE. I refer only to the fires in connection with coal-mining operations. These have been so frequent and the property loss so great, to say nothing of the many lives endangered thereby, that I think it advisable to call special attention to the subject. Many of the fires that occur could be prevented if proper precautions were taken and suitable means at hand to extinguish a fire when first started.

My desire in writing is to bring before the minds of readers the seriousness of the matter, and impress upon them the importance of safeguarding the properties in their charge, not only by furnishing the necessary equipment and keeping this in condition for immediate use, but by the adoption of strict regulations in regard to the use of lights, the handling of combustible material, and the storage of the same.

The appended list is by no means complete, as representing the fires that have occurred at mining plants within the past few months, but is evidence of the destruction that is constantly occurring at mining plants and cannot fail to impress the candid mind with the importance of closer supervision at every turn.

PENNSYLVANIA

Carrolltown	Blaine Coal Co.	Tipple	$13,000
Archbald	Delaware and Hudson Co.	Fan	not given
Arcadia	Penn. Coal & Coke	Plant	$25,000
Pottsville	Alliance Coal Co.	Plant	not given
Stoneboro	Mercer Iron & Coal Co.	Eng. and boiler house	not given
Connellsville	Frick Coke Co.	Boiler-house	$15,000
Barnesboro	Hastings Coal Co.	Tipple	not given
Somerset	Consolidated Coal Co.	Power plant and tipple	not given
Bakerton	Sterling Coal Co.	Gigantic tipple	not given
Whiteside	Madeira Hill Coal Co.	Powerhouse	$15,000
Sharon	Filer Coal Co.	Tipple and boiler house	not given
Wilkes-Barre	Kingston Coal Co.	Plant	$100,000
Adrian	Jefferson & Clfd. Co.	Co. store	not given
Somerset	Bando Coal Co.	Store and tipple	$2000

WEST VIRGINIA

Moundsville	Parrs Run C. Co.	Tipple	5000
Fairmount	Consolidated Coal Co.	4 houses	7000
Crown Hill	Black Cat. C. C.	Tipple	not given
Elk Ridge	M. B. Coal Co.	Tipple	$40,000
Mucklow	Paint Crk.	Fan house	2000
Terra Alta	Righter C. Co.	Bldg. and eng. rm.	not given
Norton, Va.	Norton C. Co.	Store	$25,000

OHIO

Neffs	Pitts. Belmont C. Co.	Mine bldgs.	25,000
Stillwater	Still. Coal Co.	Eng. house	not given
McArthur	Starr Hocking C. Co.	Plant	100,000
Crooksville	Standard Coal	Tipple	not given
Urichsville	Hiawatha C. Co.	Fan house	not given
Lisbon	Duquesne C. Co.	Mine bldgs.	not given
Kenwood	Oliver Coal Co.	Power house	20,000
Kenwood	Oliver Coal Co.	Store	10,000

ILLINOIS

Verden	Royal Colliery Co.	Plant	100,000
Marion	Hocking Washed C. Co.	Bldgs.	not stated
Carlyle	Weston Coal Co.	Power plant	$50,000
Central City	Nelson Crk. C. Co.	Power plant and tipple	not given
Pekin	Tazewell C. Co.	Plant	not given
Galesburg	Star C. Co.	Mine bldgs.	$30,000
Duquoin	Brilliant C. Co.	Plant	5000
Browder, Ky.	Caldwell Coal Co.	Plant	$25,000

CHARLTON DIXON.

Banksville, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Higher Inflammable Limit—By the continued addition of gas, the firedamp having ceased to be explosive, now becomes less and less inflammable. The mixture not only ignites less readily, but when ignited burns less regulary and quietly than did the same firedamp mixture, in the lower inflammable stage when less gas and more air were present.

The higher inflammable stage of the gas is more dangerous, in mining practice, than the lower inflammable stage of the same gas, because the slightest addition of air, which is liable to occur at any moment in the mine, causes the mixture to approach the maximum explosive point. The addition of air to firedamp in the lower explosive or inflammable stages makes the mixture less explosive or inflammable.

Another important distinction between the lower and higher stages of firedamp mixtures is the relative ease with which the flame cap may be detected in the two stages. While the flame of a safety lamp burns steadily and yields a good cap that is easily detected, in the lower inflammable stage; the lamp flame is unsteady and the flame cap generally hard to discern in the higher inflammable stage. The reason is probably to be found in the uncertain and varying amount of air in the mixture feeding the flame, which makes the gas continually approach the explosive point. The gas in this (higher) stage is said to be "sharp."

The following table will make the several stages of firedamp more clear; but it must be remembered the proportions of gas to air and percentages of gas given as marking the dividing line between the different stages or the inflammable and explosive limits are only suggestive and vary with the degree of purity of the gas; the volume, intensity and position of the igniting flame, and the pressure and temperature of the surrounding atmosphere.

FIREDAMP MIXTURES (METHANE AND AIR)

Lower Inflammable Stage	Explosive Stages: Lower Stage	Explosive Stages: Maximum Point	Explosive Stages: Higher Stage	Higher Inflammable Stage
Proportion of Gas to Air				
1 : 40	1 : 13	1 : 9.57	1 : 5	1 : 2.4
Percentage of Gas				
2.5%	7.14%	9.46%	16.67%	29.5%

The continued addition of gas thus renders the firedamp extinctive of its own flame and therefore noninflammable. The proportions and percentages given in the table denote more or less closely the limits of the several stages.

Flashdamp—This is a mixture composed almost wholly of marsh gas (CH_4) and carbon dioxide (CO_2), mixed in the proportion in which these gases diffuse into each. It is formed under special conditions, in mines, where carbon dioxide from the old workings of an abandoned seam becomes mixed with the undiluted marsh gas generated in the strata. The mixture is lighter than air and possesses the peculiar and misleading properties of extinguishing the lamp at the roof of the seam or the face of a steep pitch.

The Coal Age Pocket Book

Calculation of Composition of Flashdamp—According to the law of diffusion, gases diffuse into each other in the inverse ratio of the square roots of their densities or specific gravities. For example, the specific gravities of methane and carbon dioxide are 0.559 and 1.529, respectively; and the ratio of the velocities of diffusion of these two gases into each other is then the inverse ratio of the square roots of these numbers.

$$\frac{CH_4}{CO_2} = \frac{\sqrt{1.529}}{\sqrt{0.559}} = \frac{1.236}{0.747} = 1.65$$

which can be written 1.65 : 1: or 1650 : 1000. This ratio shows that when these gases diffuse into each other, directly, before dilution with air takes place, the mixture will contain 1650 volumes of methane for each 1000 volumes of carbon dioxide. The same result is obtained by stating the law thus: The ratio of diffusion is equal to the square root of the inverse ratio of the densities or specific gravities of the gases; or, as follows:

$$\frac{CH_4}{CO_2} = \sqrt{\frac{1.529}{0.559}} = \sqrt{2.735} = 1.653$$

A slightly different, though theoretically more correct result is obtained when the calculation is based on the densities of these gases, referred to hydrogen as unity (1). The process is as follows:

Methane (CH_4); $C = 1 \times 12 = 12$, $H_4 = 4 \times 1 = 4$

Molecular wt. = 16; density = $16 \div 2 = 8$

Carbon dioxide (CO_2); $C = 1 \times 12 = 12$, $O_2 = 2 \times 16 = 32$

Molecular wt. = 44; density = $44 \div 2 = 22$

The ratio of diffusion is then equal to the square root of the inverse ratio of these densities; or

$$\frac{CH_4}{CO_2} = \sqrt{\frac{22}{8}} = \sqrt{2.75} = 1.658$$

Calculation of Percentage Composition, by Volume—The mixture is estimated to contain

Methane (CH_4)	1658 volumes;
Carbon dioxide (CO_2)	1000 volumes;
Total	2658 volumes.

Percentage, by volume,

Methane, $\frac{1658 \times 100}{2658} = 62.38$ *per cent.*

Carbon dioxide, $\frac{1000 \times 100}{2658} = 37.62$ *per cent.*

100.00 *per cent.*

EXAMINATION QUESTIONS

Ventilation and Gases

Ques.—A certain mine is ventilated by an exhaust fan that reduces the pressure of the air in the fan drift, 14.56 lb. per sq.ft. The mine is situated at an elevation of 2500 ft. above sea level; and, at the time of observation, the reading of the barometer was 27.286 in. The measurement of the air in the intake airway showed a volume of 150,000 cu.ft. per min. entering the mine, at a temperature of 40 deg. F.; while the measurement taken on the return airway showed a volume of 162,700 cu.ft. per min. passing out of the mine, at a temperature of 70 deg. F. (a) What is the estimated volume of the gas given off in this mine per minute? (b) What is the percentage of gas in the return-air current?

Ans.—(a) In this case, the intake air is expanded both by the increase of temperature from 40 to 70 deg. F., and by the fall of pressure. The fall of pressure is given in pounds per square foot while the atmospheric pressure is in inches of mercury, and it is necessary to reduce these to the same denomination. Therefore, reducing the fall of pressure (14.56 lb. per sq.ft.) to its equivalent in inches of mercury,

$$\frac{14.56}{144 \times 0.4911} = 0.206 \textit{ in.}$$

Subtracting this fall of pressure from the given atmospheric pressure gives, for the pressure in the return airway, 27.286 — 0.206 = 27.08 in.

The absolute temperature on the intake is 460 + 40 = 500 deg. F.; and that on the return 460 + 70 = 530 deg. F. The pressure on the intake is 27.286 in.; while that on the return is 27.08 in. Since the volume of the air current varies as the absolute temperature and inversely as the pressure, the volume ratio is equal to the absolute-temperature ratio, times the inverse-pressure ratio. Then, calling the required volume of the return air x

$$\frac{x}{150{,}000} = \frac{530}{500} \times \frac{27.286}{27.08} = 1.068$$

$x = 150{,}000 \times 1.068 = 160{,}200$ *cu.ft. per min.*

The volume of gas given off in this mine is then 162,700 — 160,200 = 2500 cu.ft. per min.

(b) The percentage of gas in the return current is, then,

$$\frac{2500 \times 100}{162{,}700} = 1.5 \textit{ per cent.}$$

Ques.—What change of volume, if any, takes place at the moment of an explosion of marsh gas in air?

Ans.—At the moment of the explosion, there is no change in volume, since the two volumes of oxygen required to burn one volume of marsh gas, produce one volumn of carbon dioxide and two volumes of water vapor; while the nitrogen of the air remains unchanged.

If, however, the temperature falls after the explosion, the water vapor may be condensed to water, which will occupy so small a space comparatively that it may be practically ignored; and the ten and a half volumes of gas and air concerned in the explosion become practically eight and a half volumes of carbon dioxide and nitrogen, causing a reduction of about 19 per cent. in volume, or, say one-fifth.

Ques.—If the air is short-circuited at the fan, will this cause the speed of the fan to increase or decrease?

Ans.—When the air current is short-circuited, the resistance of the mine is cut out; and, as a result, a large quantity of air rushes through the fan, owing to the fall of pressure in the fan drift. Then, since the work lost or absorbed in the fan itself varies with the cube of the quantity of air passing, there results a large loss of work in the fan when the air is short-circuited. Therefore, assuming the power applied to the fan shaft remains unchanged, the effective power available for turning the fan is decreased and the fan runs slower than it did before the air was short-circuited.

Ques.—What is the weight of 200 cu.ft. of earth having a specific gravity of 1.4?

Ans.—This earth weighs 1.4 times as much as the same volume of water. Since 1 cu.ft. of water weighs 62.5 lb., the weight of 1 cu.ft. of the earth is 62.5 × 1.4 = 87.5 lb.; and the weight of 200 cu.ft. of this earth is 200 × 87.5 = 17,500 lb.

Ques.—What is the weight of 400 cu.ft. of carbon dioxide (CO_2) at 60 deg. F. and a barometric pressure of 30 in.? The specific gravity of this gas is 1.529 and the weight of 1 cu.ft. of air, at the given temperature and pressure is 0.0766 lb.

Ans.—The weight of 1 cu.ft. of gas, at the given temperature and pressure, being 0.0766 lb. and the specific gravity of the gas, referred to air of the same temperature and pressure, being 1.529, the weight of 1 cu.ft. of this gas is 0.0766 × 1.529 = 0.1171 lb. The weight of 400 cu.ft. of carbon-dioxide gas, at the given temperature and pressure, is then 0.1171 × 400 = 46.84 lb.

Ques.—What constitutes firedamp; and what gaseous mixtures does it include?

Ans.—The term firedamp, in this country, applies to any inflammable or explosive mixture of gas and air. It is generally understood to refer to a mixture of marsh gas and air, in explosive or inflammable proportions; although it is known that other explosive or inflammable gases are present; and, in many cases, the firedamp contains certain proportions of extinctive gases, such as carbon dioxide and nitrogen.

The presence of these gases greatly modifies the character of the firedamp, the inflammable or explosive gases increasing and the extinctive gases decreasing the danger of the mixture. The presence of inflammable gases having a lower temperature of ignition than marsh gas, such as ethane, carbon monoxide, or sulphureted hydrogen renders the firedamp more easily ignitable and dangerous, as does also fine coal dust in suspension in the air of the mine.

COAL AND COKE NEWS

Washington, D. C.

The following statement has been officially authorized here by the West Virginia Mining Association:

The Paint Creek Collieries Co. and the Standard Splint and Gas Coal Co. which were operated as Union mines before the strike which began sixteen months ago have signed new contracts with the union, thus ending the long strike at these mines, which employ about half the total number of miners on Paint Creek. The contract includes the "check-off," under the terms of which every employee, whether willingly or unwillingly, is compelled to pay union dues. The other mines on Paint Creek will not concede the check-off. Thus the union does not extend its territory under the new contracts.

The settlement was made on a basis of 51 cents a ton for pick mining splint coal, which is 4 cents a ton less than the scale in effect when the strike began, and 29 cents for machine mining splint coal, a reduction of 2½ cents a ton from the rate paid at the time the strike began.

As a pick miner averages about 250 tons a month this means that the men, after 16 months of idleness and turmoil, have been compelled by the officers of the union to lose an average of $10 a month or $120 a year in wages in order that the organization may be enriched to the tune of $1 per head fortnight in dues through the check-off.

Or, to put the same thing in other words, the officers of the union have shown by this action that the organization is really interested in the miner only as a source of revenue for its own coffers. Adding the $24 a year in dues to the reduction in wages makes an average of $144 a year that the miners will lose through their long strike.

Why is Anthracite High Priced?

Investigation of the anthracite coal companies to ascertain the causes of high prices and prospective government ownership of mines is provided for in a resolution that will be introduced in the House next week by Representative Murray of Massachusetts.

The resolution will declare that the prices of anthracite coal are advanced at will by the operators and that exactions amounting to millions of dollars annually are now enforced from the public. It will set forth that an arbitrary increase of from 60 to 70 cents a ton has been made in the prices of coal in Boston within the last few weeks and that the price is now excessive.

It will further declare that these increases have not been due to advances in wages, as the operators have declared, but that they represent increased profits to the operators solely.

Mr. Murray will ask that the investigation be made by the department of commerce, but the house itself is to consider the question of government ownership.

Japan Supplies Army Coal

A Jananese firm, Mitsui Bussan Kaisha, has been awarded a contract for 80,000 tons of coal to be supplied to the army of the Philippines during the fiscal year which began July 1. The contract is said to be the largest ever awarded by the army in the Philippines, being 20,000 tons in excess of the amount ordered for any previous year. The price at which the contract was accepted included delivery of the coal at Manila Bay and amounted to $6.20 a ton for 20,000 tons of washed nut coal or lump coal, and $5.85 a ton for 60,000 tons of best cleaned lump coal. Two other bids were made, one being $7.70 a ton for Australian coal and the other $6.45 a ton for Chinese coal.

HARRISBURG, PENN.

The State Railroad Commission has held its last hearing for it is expected that Governor Tener will name the Public Utilities Commission next week, which will take over the railroad commission. The Commission had about a score of complaints before it and most of these were turned over to the prospective commission to investigate.

The Public Utilities Commission will also take over the Bureau of Railroads, now connected with the Department of Internal Affairs, and the Bureau of Statistics which has been connected with this department, will be taken over by the new Department of Labor and Industry.

More Petty Strikes

The absence of union buttons from the overalls of four hundred employees of the Jermyn Nos. 1 and 2 mines, at Scranton, of Jermyn & Co., led to a strike on Thursday of two thousand men. The miners refused to enter the mines until the four hundred delinquents and nonunionists ornamented themselves with emblems showing their status in the union. District officials of the U. M. W. of A. are trying to straighten out the tangle.

"Button strikes" have also been called at West Nanticoke and the Baltimore No. 5 Colliery of the Delaware & Hudson Co., in Wilkes-Barre, the men refusing to work with miners who are not in good standing with the union.

In the Hazleton region trouble broke out at Jeddo No. 5 Colliery of the G. B. Markle Co., due to the company's refusal to pay a certain class of outside labor $1.50 a day, and raise the wages of patchers from $1.41 to $1.50, it is feared that this trouble will cause a general strike throughout this company's collieries. A strike has also been called at the colliery of the Brookwood Coal Co. in this region, the miners want 99c. for a car of coal and 50c. for rock; they now receive 90c. for coal and 25c. for rock, these prices prevail in skipping pillars. As a counter proposition the company agrees to pay the miners $2.47 and laborers $2.13. In other words the company demands that the men work on a consideration basis, eight hours to constitute a day's work. All coal mined in that time belongs to the company and will not allow of extra compensation. The men are determined to fight out this issue, and it is feared that the pump runners and engineers will be called out.

The week beginning July 21, a convention will be held at Wilkes-Barre, of District No. 1, at which time the miners will try to devise some plan that will make "button strikes" unnecessary, which will probably take up the greater part of the time of the convention period. In all probability it will pass a rule that buttons be issued monthly for dues and not quarterly as is the present case.

PENNSYLVANIA

Anthracite

Scranton—Another public-school building in Scranton has been seriously damaged as a result of a mine cave. While there is no danger of an immediate collapse of the building, steps will have to be taken immediately to check any further settling of the ground.

Wilkes-Barre—In an opinion handed down by Judge Fuller refusing a new trial in the suit of Shiffer and others against the Hudson Coal Co., it is stated as regards excesive coal royalty:

The suggestion of hardship in being compelled to pay for more coal than can be mined, has been urged and ignored in all cases. In the present case the net hardship merely consists in paying, exclusive of interest, about $50,000 for about 100,000 tons of coal, making an average royalty of about 50c. per ton which is not inordinate in view of the profits derived from the business.

Carbondale—Charles Enzian, of the United States Bureau of Mines; E. R. Pettebone, chief engineer for the D. & H. Co.; James E. Roderick, Chief of the State Department of Mines, and several other engineers have been at Carbondale endeavoring to determine the best means of extinguishing the mine fire which has been raging there for several years. It covers an area of 60 acres and is located in the surface vein. The state recently made an appropriation of $150,000 with which to extinguish the fire.

Pottsville—The coal companies of this region, on Friday, July 18, issued orders prohibiting all "beer picnics" on their grounds.

Coal tracts of these companies which extend over the mountain ranges in this region have been the scene of hundreds of "booze picnics" the last few months, particularly on Sundays, and the companies have decided to end the orgies by notifying the coal and iron police to arrest all trespassers upon their property.

The large coal companies have taken part in the movement which is not much of a surprise as they have for years prosecuted speakeasies, and the Reading company has vigorously prohibited beer drinking in all its parks. Patrons who do not indulge in intoxicants will not be molested in their recreations.

Bituminous

The Pittsburgh Coal Co. has taken up the use of gas-proof under-cutting machines, eight of these machines being now in use. Two have been placed in the mine at Manown, two in Sunnyside, and four in the Galatin mine. It is said the coal company will adopt this style of machine for work in all of its mines, as the gas-proof feature promises to settle to a great extent the differences now existing between the men and the management on the use of safety lamps and electric machines in the same mines.

Pittsburgh—With the rise of water in the Ohio River 59 barges of coal were started for Louisville, Ky., by the Monongahela River Consolidated Coal & Coke Co. With the continued high stage of water a good deal of coal will be shipped down the river.

George C. Theiff, former president of the Monongahela River Consolidated Coal & Coke Co., and Rufus Crawford, have purchased 900 acres of Washington County land at a price said to be $800 an acre.

Latrobe—The West End Co. is seeking new power consumers in the Latrobe and Ligonier districts and within the past few weeks have contracted for the delivery of approximately 4500 hp. This is all new business and is said to represent a revenue of $90,000 a year. The West End extension into the Ligonier valley is bringing results in the way of power contracts.

Monongahela—An order is being promulgated by the Monongahela River Consolidated Coal & Coke Co., that no boys under 16 years should be employed at their docks and marine ways. This order was the result of the accidental drowning of two boys while at work at Brown's Station and is said to have been the suggestion of the factory-inspection department.

Indiana—Four men were instantly killed and two others badly injured when a mine-drainage shaft caved in at Ernest. The men were sinking a new shaft on the land of the Jefferson and Clearfield Coal & Iron companies at Ernest, which was to be used to drain the water from other mines.

WEST VIRGINIA

Charleston—It is stated that the strike upon the Paint Creek has been settled again by an agreement signed between W. L. Connell, of Scranton, president of the Paint Creek Colliery Co., and John P. White, president of the United Mine Workers of America, in which the miners win many of the demands for which they were contending, among them being the check-off and recognition of the union.

A special grand jury has been convened by Judge Henry K. Black, of the Kanawha County Intermediate Court, in order to make an inquiry into the riotous conditions that have prevailed in the Paint and Cabin Creek coal field for over a year.

KENTUCKY

Louisville—F. Pigent, of Paris, France, who was passing through Louisville on his way from New Orleans to Central City, Ky., where he has mining interests, became ill a few days ago, and was taken from the Louisville & Nashville train to a local hospital. An examination desclosed the fact that he was suffering from an abdominal trouble, and an operation will be necessary. It will probably be some time before the French mining magnate can proceed on his trip to the Central City district.

Earlington—The St. Bernard Mining Co. has just completed, at Earlington, Ky., the coal washer for its mines there, which has been in course of construction for more than a year. The foundations of the washing plant were laid in 1912, and the concrete reservoir which supplies it with water was constructed during the winter. The principal feature of the plant is a belt conveyor 162 feet long, which will cary the coal from the railroad tracks, about forty feet below the washer, into the plant proper, on an incline of about 30 deg. The plant has a capacity of 800 tons a day.

Hazard—The Hazard Light & Power Co., of Hazard, Ky., which recently completed a plant designed to furnish light and power to the town, including the numerous coal mining plants which have been opened up in that vicinity during the past few months, is about ready to furnish current to all customers. The work of making connections is proceeding, and the town will soon be well lighted. The company also manufactures ice, a luxury which is much appreciated by the citizens.

Frankfort—The Elkhorn and Beaver Valley Railway Co., of Boyd county, Ky., which is building a line connecting with the Chesapeake & Ohio, in Eastern Kentucky, has filed amended articles of incorporation at Frankfort, Ky., increasing its capital stock from $270,000 to $400,000. The articles were signed by George W. Stevens, president of the company, who is also president of the Chesapeake & Ohio Railroad Company. The road, when completed, will give an outlet for large properties, which are rich in both coal and lumber.

OHIO

After Sept. 1, 1913, the Ohio Mine Inspectors Department will have ceased to exist as a separate branch of the state government. By a new law passed last winter a number of departments having to do with mines, workshops and factories, engines, fire risks, labor arbitration and the like, are to be grouped under an authority known as the Ohio Industrial Commission. Greater economy and a more thorough coöperation for the public good along industrial lines are expected from this centralization of responsibility. As matters now stand, some of the departments overlap and in a measure conflict with each other. The commission consists of three members. While no authoritative announcement has been made it is expected that Chief Mine Inspector J. C. Davies and his corps of district inspectors will be retained with the new body. It is not the design of the law to cripple the efficiency. The office of chief inspector of mines was created in 1874 with Andrew Roy as incumbent.

Cincinnati—Application has been made to the Superior Court here for receivers for the Marmet Coal Co., a million-dollar corporation, whose coal lands are located mostly in West Virginia and Pennsylvania. The request was granted and Edwin Marmet, president of the company, and Charles W. Poysell, general manager, were named by the court as receivers upon furnishing a bond of $50,000.

INDIANA

Indianapolis—Word comes to operators in this city that a vein of coal 5 ft. thick was pierced by well drillers at 300 ft., near Newman, Ill., the first discovery of the kind indicating paying quantities.

Twenty-six general organizers of the U. M. W. of A. were at headquarters in this city this week, discussing the strike situations, particularly that in Virginia.

ILLINOIS

Pana—Judge McBride, of the Christian Circuit Court, has appointed Francis R. Roberts, of Chicago, and J. M. Taylor, of Taylorville, Ill., receivers for the Pana Coal Co., a $500,000 corporation, upon petition of the Continental and Commercial Trust and Savings Bank of Chicago, trustees. It is asserted that the Pana Coal Co. defaulted in the payment of the first installment of the bonds.

Chicago—A. R. MacKlay, special examiner for the Interstate Commerce Commission, has been taking testimony concerning the freight rates on hard- and soft-coal shipment between Chicago, Proviso and Elmhurst, which are the subjects of a complaint filed by the Hammerschmidt & Franzen Co.

New regulations for the distribution of coal cars have been issued by the Baltimore & Ohio R.R., to become effective Aug. 1. During extended periods of full car supply, mines will be given cars up to order, provided such cars are loaded and consigned promptly. Mine ratings will be based upon the month showing the highest average daily shipment of the total output of the operators during the preceding 12 months. Cars will be pro-rated on a tonnage basis with a 50-ton car as a unit. A record of car distribution of all mines on the Baltimore & Ohio lines will be kept in the office of the Superintendent, and the record will be open to inspection of authorized representatives of mine operators.

ARKANSAS

Harrison—Judge F. A. Youmans has appointed Hiram Butterfield a special master in chancery for several thousand acres of land in Marion County, together with mining machinery located on the property, in order to satisfy a judgment of $65,000 in favor of the Rhode Island Hospital Trust Co., of Portland, Me., which holds bonds of the White River Lumber & Mineral Co.

Little Rock—Tom Shaw, State Mine Inspector, has reported to J. C. Clary, State Commissioner of Labor, that he has been compelled to close down a mine at Bonanza and another at Jenny Lind, because of inadequate water supply, and the lack of precautionary measures against accidents.

OKLAHOMA

McCurtain—The McCurtain Mine Relief Committee having in charge the collection and distribution of funds to those rendered dependent by the explosion in mine No. 2 of the Sans Bois Coal Co., at McCurtain, Okla., on Mar. 20, have made public their report. It shows that a total of $55.177.63 was collected for the victims of which the Carnegie Hero Fund

donated $15,000, the largest single subscription. The average amount paid to each dependent family was $923.89; the average amount paid to each dependent person was $286.40, and the average amount paid each injured person was $226.80.

KANSAS

Leavenworth—The north shaft of the Home-Riverside Coal Mining Co., the first mine to be sunk in Kansas, is to be closed permanently according to an order made by Judge Wendorfs of the District Court, who granted an application of the receivers to close the old shaft.

This shaft was sunk more than fifty years ago by the Leavenworth Coal Mining Co. Recently a fire in the mule barn made it impossible to work the shaft because of the danger to the miners. It is about 750 ft. deep.

COLORADO

Colorado Springs—The officials of the Curtis-Rapsen Coal Co. have abandoned the shaft of the Curtis mine, five miles north of Colorado Springs. It has been impossible to extinguish a fire which has been raging in the different levels of this mine.

MONTANA

Butte—The recent order of the Interstate Commerce Commission reducing coal rates between Sheridan, Wyoming, and adjacent points, and points in North Dakota, Washington, Idaho and Montana has aroused considerable opposition among the coal-mining interests of Carbon County, Montana. Evidence has been presented to Federal Commissioner Esch, of the Interstate Commerce Commission, tending to show that if the order is enforced, five of the principal coal mines of Carbon County will be forced to suspend operations, with the result that 1000 miners will be thrown out of employment. It is stated in the complaint that the cost of producing coal in Montana is one dollar per ton higher than in Wyoming because of labor conditions, and that under the new ruling the mines in this state would be unable to compete with those in Wyoming, due to the fact that coal producers in the latter state would be able to ship coal into Montana competitive territory at a rate of 10c. per ton lower than the local rates.

WYOMING

Cheyenne—Federal Judge J. A. Riner has dismissed eight or nine cases, charging G. J. Quealey, a wealthy operator of Kemmerer, Wyo., with fraudulent acquisition of coal land.

FOREIGN NEWS

Paris, France—The French government has selected the port of Papeiti, one of the Society Islands in the South Pacific Ocean, as a suitable port to serve as a French coaling station in view of the opening of the Panama Canal. This port was the selection of both the private and official commissions which have been investigating the subject.

Washington, D. C.—A prominent importer, who supplies the railroad and navy of European countries with coal and the general trade with grain, wishes to establish a permanent connection with American exporters of these articles. Coal briquettes are especially desired, but they must stand a chemical test in competition with the products of other countries. Prices should be quoted at port of destination.

Bremen, Germany—The total number of tons of coal exported from Germany during the first five months of this year amounted to 13,687,651 tons, an increase of 654,804 tons compared with the coresponding period of last year. Germany's best foreign customer is Austria Hungary, which took 4½ million tons of coal. The coal strike in Belgium was particularly advantageous to the German exporters as 150,000 more tons of coal were exported during that period.

PUBLICATIONS RECEIVED

Department of the Interior, Bureau of Mines. The Analysis of Black Powder and Dynamite. By Walter O. Snelling and C. G. Storm. Bulletin 51; 78 pages, 6x9 in.; with numerous halftones, figures, curves and tables.

Department of the Interior, Bureau of Mines. Heavy Oil as Fuel for Internal Combustion Engines. By Irving C. Allen. Technical paper, 37; Petroleum technology, 5; 36 pages, 6x9 in., without illustrations. This paper is issued in response to the many inquiries regarding the supply of heavy oils and their use as fuel for steam raising and in internal-combustion engines.

PERSONALS

T. K. Webster, for many years president of the Webster Mfg. Co., has severed his connections with this company, and F. S. Shaw has been elected president in his place. The officers of the company at present are: F. S. Shaw, president; A. T. Perkins, vice-president and general manager; Alex. Kiskadden, vice-pres.; Charles S. Clarke, treasurer; L. H. Webster, secretary.

William Clifford, well known to mining men, has sold his mine-fan manufacturing plant at Jeanette, Penn., where he has been manufacturing the Clifford fan for a number of years. The reason given is that Mr. Clifford desires to retire to a less active life. It is stated that he intends to make a visit to England at the end of the month, returning in the autumn. He will retain his home in the park adjacent to the plant works, and will continue to pursue the scientific studies in which he has been engaged.

Governor Tener has announced the reappointment of John Birkinbine, of Cynwyd, Montgomery County, as a member of the State Water Commission, Mr. Birkinbine is the only member of the original commission named by Governor Pennypacker in 1905. He is one of the best known scientists of the country and an authority on hydraulic engineering. He has been president of the Franklin Institute, American Institute of Mining Engineers, the Engineers' Club of Philadelphia, and the State Forestry Commission, and is a member of many leading learned societies, in addition to being author of a number of notable works. He has been identified with many famous engineering enterprises.

OBITUARY

George Harrison, former state mine inspector, died recently at the home of his daughter at Caldwell, Noble County, Ohio, after an illness of nearly a year. He was attacked by paralysis last fall, and never recovered. He served as mine inspector during the Herrick, Pattison and Harris administrations, and during all but about six months of the Harmon administration. He succeeded in securing the enactment of a new mining code of laws. The office force of the Ohio State Mine Inspector attended the funeral.

CONSTRUCTION NEWS

Wheeling, W. Va.—Work was begun this week on the steel tipple of No. 6 coal mine of the Rail & River Coal Co.

Washington, Penn.—The Pittsburgh Coal Co. is now opening two new mines in Mt. Pleasant and Cecil townships in Washington Co. on lands which were at one time owned by George Washington, the first president of the United States. A force of men is at work at each opening, and it is expected that the work will be pushed so as to be completed by the time that the new railroad, which is being built reaches the mine.

Chicago, Ill.—The Forester Coal & Coke Co., of Duquoin, Ill., whose tipple was destroyed by fire on July 1, have just placed their order with the Roberts and Schaefer Company, Chicago, for a steel tipple which, it is claimed, will be the most modern and best equipped tipple in the State of Illinois. The equipment will include a Marcus patent picking table screen. No money will be spared to make the entire plant the very best that can be built, not only in regard to being fireproof and durable but also in the matter of preparing coal.

Cramer, Penn.—The Northwestern Mining and Exchange Co., one of the Erie subsidiaries, has announced that work will be commenced on the construction of two immense shafts at Cramer, Jefferson County. The shafts, according to specifications, will be the largest in this part of the Bituminous district. One will be 300 feet deep and the other 310 feet deep. The work of sinking these shafts will commence about the first of August. This will mean the building of a mining town at Cramer, which is now but a cross-roads.

NEW INCORPORATIONS

Kansas City, Mo.—The Grey-Bryan Coal Co. has increased its capital from $10,000 to $30,000.

Aurora, Ind.—The Pittsburgh Coal Co. of Aurora has increased its capital stock to $12,500.

Frankfort, Ky.—Joseph Walton & Co., of Louisville, have changed their name to the Pittsburgh Coal Co.

Chicago, Ill.—Bell Coal & Fuel Co. has been incorporated by Louis Metcoff, A. L. Greenberg and Eli Metcoff, with a capital of $5000.

Frankfort, Ky.—The Sturgeon Creek Coal Co., of Idomay, has been incorporated with a capital of $1000. The incorporators are H. G. Parrish, Walter Gourley, T. McGuire and D. W. Gourley.

Wheeling, W. Va.—The Wheeling Monroe Coal Co., of Wheeling, W. Va., has been incorporated with a capital stock of $25,000 in order to develop coal properties in Monroe County, W. Va.

Johnstown, Penn.—The Park Hill Coal Co. has been incorporated with a capital of $50,000. The incorporators are Harry Davis, of Conemaugh; T. J. Pearce, of Portage; E. T. Neelis, of Johnstown.

Chicago, Ill.—The Alkali Mine Co. of Chicago has been incorporated for $75,000. It is expected to mine and deal in mine products. The incorporators are John F. Hummer, J. Paul Dunne and Richard Klein.

Nashville, Tenn.—The Highland Coal & Lumber Co., of Davidson County, has been incorporated with a capital stock of $25,000. The incorporators are W. V. Davidson, M. F. Greene, Lucien Clark, M. M. Davidson and H. M. Greene.

Oklahoma City, Okla.—The Pomeroy Coal Mining Co., of McAllister, has been incorporated with a capital stock of $12,500. The incorporators are G. A. Miller, Ernest W. Schreiner, of McAllister, and Jacob Schreiner, of Oklahoma City.

North Lima, Ohio—The North Lima Coal Co., of North Lima, Ohio, has been incorporated with a capital stock of $10,000 to mine and deal in coal. The incorporators are: James Aspenwall, Hector Buxin, Thomas Murphy, Paul Koachway and Lucien Affrance.

Bentleyville, Penn.—Articles of incorporation have been taken out in Delaware by the Strange Creek Coal & Coke Co., of Bentleyville, Penn., to acquire coal and coke lands. The incorporators are James Stevenson, J. G. Richellson, of Bentleyville, and Charles R. Trew, of Charleroi, Penn. The capital stock is $200,000.

Springfield, Ill.—The Schniewind Coke Oven Co., of Hartford, Conn., has been granted a license to operate in Illinois. The capital stock is $500,000 and the incorporators are Vice-President Louis Wilputte, of New York, secretary, Robert C. Metcalfe, of Newark, N. J., and William H. Childs, of Brooklyn, N. Y. The principal place of business in Illinois is the Coal Products Co., at Joliet.

INDUSTRIAL NEWS

Johnstown, Penn.—Wm. Schaffer, of Somerset, has purchased the surface and the top vein of coal of the Harrison Lohr farm in Shade township, Somerset County.

Independence, Kan.—Attorney A. M. Parsons, formerly of Caney, now of Okmulgee, Okla., secured a lease on the Foreman farm, near Caney, and will immediately form a company to drill for coal.

Johnstown, Penn.—John Lochrie will within a few days begin work on the opening of a new mine over the hill from his present plant near Scalp Level, where he owns the coal under 200 acres.

Greensburg, Penn.—A coal deal is now on which will take up all the land on the north side of Crooked Creek, at Chambersville, Indiana County, which is one of the few tracts remaining unsold.

Waynesburg, Penn.—Georgia E. Rice and T. Riley Huffman, of Waynesburg, have closed a deal in which they sold 1000 acres of coal land in Belmont County, Ohio, to A. J. Pasie, of Pittsburgh. The consideration is $62,500.

Pottsville, Penn.—This township will profit by the new coal operation of the P. & R. C. & I. Co. at Mt. Laffee, where the immense coal strippings will lay bare the mammoth and other veins.

Winchester, Ky.—Slemp Coal Co. has sold to the Henry Coal & Coke Co., of Hazard, 2802 acres of coal lands, of which 641 acres is in fee and the remainder in mineral rights. The company will at once proceed to develop the property.

Myersdale, Penn.—The Keystone Coal Co. has moved a diamond drill to the Alex. Speicher farm, part of the Wilehlm tract in Elk Lick township to prospect for a seam of big vein coal supposed to underlie a portion of that farm.

Carbon Hills, Ohio—Three thousand coal miners, members of the United Mine Workers of America, marched to the Hawthorne & Floodwood Mines at Forest Junction in Essex County on July 18 and removed 100 nonunion miners from their work.

Fairmont, W. Va.—The Syndicate headed by the Fidelity Trust Co., of Baltimore, have disposed of more than $3,000,000 of the issue of $4,000,000 Elkhorn Co.'s 5% collateral mortgage bonds. It is expected that the rest of the bonds will be sold in a short time.

Ashland, Penn.—Gilberton colliery, an operation of the Philadelphia & Reading Coal & Iron Co., has suspended operations for four months, during which time a new breaker is to take the place of the present dilapidated structure. The colliery employs 500 men and boys.

Indiana, Penn.—Manor Real Estate & Trust Co., of Philadelphia, on Wednesday, completed the purchase of 434 acres of coal land in Green and Cherryhill townships, through their Indiana agents, Benj. J. W. Carskaddon and E. E. Davis, whose offices are in the Marshall Building.

Birmingham, Ala.—The Maryland Coal Co., which has recently opened the new mines in the Sipsey Coal fields expects to begin shipping coal by August 1. Recently the 'Frisco Railroad extended its branch line from Empire to the mine at an expense of more than $200,000.

Heber Springs, Ark.—D. M. McGraw, of Altus, superintendent of the Western Coal & Mineral Co., at Dennins, is here taking options on 10,000 acres of upland along the Missouri & North Arkansas R.R. Coal has been discovered there and this corporation is securing options with a view of prospecting.

Albany, N. Y.—Petroleum and natural gas are the only fuels that are mined in the state of New York. The value of these which was obtained in the year of 1912 was $3,220.67. There was a gain in the output of gas, which in volume amounted to 6,564,659 cu.ft., while the oil industry experienced a decline.

Somerset, Penn.—The initial first-aid meeting in Somerset County was held on July 16 on the baseball grounds. It was under the auspices of the Bituminous Committee of the State Y. M. C. A., and T. D. Dilts, of Greensburg, was in charge. Nine teams entered into the competition for the cup, medals and prizes which were awarded.

Pittsburgh, Penn.—An order has been granted by the United States District Court authorizing the payment of the wages of the miners of the Jenner-Quemahoning Coal Co. on July 26. The latter concern is a subsidiary company of the United Coal Co., which has been in the hands of a receiver for some time. The total amount of wages to be paid is $23,589.92.

Washington, D. C.—The first coal mine opened in the United States is about to resume operation. It was abandoned about one hundred years ago, and is situated in the Richmond Basin, Henrico County, Va. It was first opened in 1700 and continued working for 100 years, when it was believed that its coal had become exhausted. Recent explorations find a considerable amount of coal there, and work will soon begin.

Harrisburg, Penn.—The State Department of Mines is preparing to make a thorough investigation of the manner of drilling gas and oil wells through coal measures, in order to prepare laws for submission to the legislature of 1915, regulating such work. The inquiry will be of great importance to the Pittsburgh district, and probably will lead to devising of measures which will settle disputes of long standing.

Columbus, Ohio—The committee named by each side and approved by the commission which is investigating the systems of weighing coal for the purpose of determining miners' wages in Ohio, are as follows: Miners: C. W. Savage, Columbus; William Roy, Klee; Percy Tetlow, Washingtonville; Lee Hall, Cambridge; William Greene, Coshocton; John Moore, Columbus. Operators: E. A. Cole, Columbus; W. H. Haskins, Coshoctom; J. H. Pritchard, Columbus; D. J. Jorden, Cleveland. These committees will be present at all sessions of the commission.

COAL TRADE REVIEWS

GENERAL REVIEW

Anthracite quiet but steady. High prices still ruling on soft coal. Heavy shipments to the Northwest causing a shortage in the East. Resumption of mining in West Virginia is not relieving the pressure for coal. Labor shortage growing worse.

The domestic grades of hard coal are moving off in good shape under the restricted production now in effect. There has been a fair demand for a July delivery and some improvement is noticeable. However large percentages of the steam grades are going into storage and individual operators are making some concession on the regular company circular. There is a great deal of uncertainty over the new Pennsylvania state tax on anthracite.

Some new record prices for bituminous have been paid in New England for small tonnages required to fill out cargoes; such prices cannot, however, be considered the market although it shows what a strong position the sellers hold. Operators continue adhering strictly to their policy of not quoting for future delivery and there does not appear to be any weak spot in the trade that can possibly lead to a slump. The heavy demand in the West and Northwest has more than made up for any unsteadiness as a result of the resumption of work in the West Virginia field. As a matter of fact West Virginia operators are pressed for any kind of coal while the Pennsylvania companies are entirely sold up on everything but the very lowest grades. The latter operators have had practically a full car supply, due to the slack anthracite trade, much of the hard-coal equipment being diverted into the bituminous service.

Mining in the Pittsburgh district continues at maximum capacity. Dealers agree that the business has never been so good at this season, and it is now impossible to contract at the prevailing circular. There is little new buying but the demand on contract is more than sufficient to cover the production. The settlement of the West Virginia labor trouble has not had any apparent effect upon the local situation. At some of the adjoining points conditions are so hard that considerable uneasiness is felt. Nobody has sufficient coal and even producers are being forced to buy in order to fill out their contracts.

There is a tendency to increase prices in Ohio; one of the best features of the trade there is the heavy domstic demand but manufacturers are also taking a large tonnage. There has been a heavy movement from the mines into the Hampton Roads market but there is still a shortage and prompt tonnages command a ready premium. There are no unusual surpluses in the Southern market and the trade is apparently capable of absorbing the full production; it is anticipated that this district will see one of the most severe car shortages in its history if there is no improvement.

There is an upward tendency in prices on nearly all grades in the Middle Western markets. The inadequate labor supply is making it difficult to handle the coal at destination and the car shortage is becoming steadily worse; indications are that the situation in this latter respect will be acute this fall. No change has occurred on the Eastern coals in this market, as a result of the settlement of the West Virginia labor controversy.

BOSTON, MASS.

Producers are well supplied with orders and prices continue hard, particularly for prompt delivery. Uncertainty making it difficult to buy for future delivery. Pennsylvania operators benefiting by the release of cars in the anthracite service. Hard coal picking up.

Bituminous—Prices on Pocahontas and New River continue firm, especially for spot shipment. Detention still prevails at the loading piers but another week will probably see tonnage being cared for in better fashion. Some of the shippers have been obliged to go into the market for small amounts to help load steamers and as high as $3.15 has been paid this week for purchases of that kind. All the agencies are well supplied with orders, in fact too well supplied for July and August, and there is small chance of quotations being any easier at least for weeks to come.

The Georges Creek situation does not vary much from that at Hampton Roads. While steamers and vessels have been loading at Baltimore in shorter time yet there is not much improvement from a week ago. The volume of business on this grade is large and the shippers are expected to have difficulty in meeting the market requirements.

In Pennsylvania there is an increasing disposition not to close further business for deferred delivery. Operators are willing to sell at the market their current output but they lose interest when prices are asked for September and October. A slight spurt in the New England demand for Pennsylvania coals is occasioned by the release of certain anthracite transportation to freight soft coal, while the hard coal trade is temporarily dull. Quite a tonnage has been placed in this way lately to replace the shipments of Southern coals that would normally come to this market in July.

Anthracite—While slack early in the month, there is now a good demand for hard coal for shipment on July prices. Stocks are large, but as fast as room is made the dealers are asking for further shipments. Such cargoes, however, are pretty well assorted and the pinch over stove size is not being felt for the present.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$1.10@1.45	$1.35@1.65	$1.67@1.77	
Philadelphia*	2.35@2.70	2.60@2.90	2.92@3.02	
New York*	2.65@3.00	2.90@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.85@3.15
Providence†				3.88@4.00
Boston†				4.00@4.10

*F.o.b. †On cars.

NEW YORK

New York quotations on soft coal experienced a further advance. Still inquiries for contracts. Shortage due to heavy shipments of West Virginia coal into the Northwest. Anthracite dull and quiet.

Bituminous—The local soft-coal market is, if anything, in a stronger position than last week. The shortage is becoming so pronounced that competing companies are endeavoring to place orders with each other. There has also been more than the usual number of inquiries for contracts during the past week.

One of the principal causes for the hard local situation is due to the fact that shipments from West Virginia are light, most of this coal being diverted into the North and Northwestern markets. Another important influence is the short supply of labor. Mines generally are attempting to make the highest possible production they can, but the shortage of miners is proving a serious handicap. One large Pennsylvania company reports a shortage of fully 30 per cent. The New York market has strengthened to such an extent during the week, that it is necessary to advance quotations for the first time in several months, the trade now being hard and firm on the following basis:

West Virginia steam, $2.55@2.60; fair grades of Pennsylvania, $2.75@2.80; good grades of Pennsylvania, $2.80@2.85; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.25@3.30.

Anthracite—The hard-coal market is quiet and dull, and production at the mines was further reduced during the week. Stove coal is the only grade in any demand at all, while pea and buckwheat are being stored in considerable tonnages, although not so much as was the case before the production was curtailed.

The car supply is excellent; in fact, there is such a surplus of equipment, that some is being diverted into the bituminous trade, much to the benefit of the Pennsylvania shippers into the New England market. Labor is in fair supply and fully up to requirements. We continue quoting the New York market on the following basis:

		Individual		
	Circular	Lehigh	Scranton	Schuylkill
Broken	$4.80	$4.45@$4.65	$4.50@$4.70	$4.45@$4.65
Egg	5.05	4.80@ 4.90	4.85@ 4.95	4.80@ 4.90
Stove	5.05	4.90	4.95	4.90 .....
Chestnut	5.25	5.05@ 5.15	5.10@ 5.20	5.05@ 5.15
Pea	3.50	3.25@ 3.45	3.30@ 3.50	3.25@ 3.45
Buckwheat	2.75	2.10@ 2.45	2.50@ 2.75	2.10@ 2.45
Rice	2.25	1.75@ 1.95	2.25	1.75@ 1.95
Barley	1.75	1.30@ 1.70	1.75	1.30@ 1.70

PITTSBURGH, PENN.

Mining up to maximum capacity with movement mostly on contract. Coke buyers refuse absolutely to meet the $2.50 price of the producers and the situation is tense. Both sides are holding out firmly and furnaces are being forced to bank or buy soft coke at relatively high prices.

Bituminous—Mining operations continue at practically their maximum; there is little new buying but the production is well absorbed by contract requirements. Slack continues in active demand, so that the concessions from the regular figure usually so frequent at this time of year are now almost absent. Car and labor supply are fairly good. The Pittsburgh district is not particularly disturbed over what appears to be the final settlement in the West Virginia labor difficulties, although it has been held that a considerable part of the prosperity in this district has been due to the curtailed output in West Virginia. We continue to quote prices as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The market has been almost stagnant the past week, as refers to actual transactions, but the market position has been highly interesting, a tense situation being presented by the absolute refusal of several furnaces to pay the $2.50 price demanded by operators. Such furnaces are looking for coke, and have purchased several lots of soft coke, at relatively high prices. As already reported, there have been several bankings of furnaces and it is believed that others will do likewise rather than pay the $2.50 price. There is not a sign of weakening in the position of operators, there being little coke to be found for prompt shipment at the figure, and none offered at a lower price. It is doubtful whether there will be much movement in the market until the question of August requirements comes up. This will open up the case with respect to the furnaces which paid $2.50 to secure a July supply. We quote: Prompt furnace, $2.50@2.60; contract furnace, $2.50; prompt foundry, $2.85@3; contract foundry, $2.85@3, per ton at ovens.

There has apparently been sufficient restriction of output to meet the situation presented by slightly decreased pig-iron production, and by the abstention of several operating furnaces from taking their normal tonnages. The "Courier" reports production in the week ending July 12 at 390,470 tons, an increase of 57,000 tons over the preceding week, but 18,000 tons less than the average in June, and shipments at 11,274 cars, an increase of 1609 cars, the shipments carrying 388,876 tons, an increase of 56,248 tons.

PHILADELPHIA, PENN.

Some price cutting by individual hard coal operators. Steam sizes in long supply but domestic grades are moving off well under the restricted production. Uncertainty over the new state tax continues. Bituminous remarkably strong.

Compared with the corresponding period last year, the anthracite coal business in this vicinity presents anything but a favorable outlook. The summer months always see a marked falling off in the demand for coal, and this year is no exception. It is understood, however, that with the curtailed production, the companies are moving off practically all of the domestic coals, some of course, going into stock; but the steam sizes still continue to be far in excess of the demand, and are added to the already large quantities of these grades in stock. Individual operators are reported as cutting prices anywhere from 15 to 25c. on the various sizes, the extent of the concession varying according to the demand at the time of the sale.

The Pennsylvania State tax still continues to be discussed. It has not as yet been decided by the dealers here in what way they will handle it. Some talk of an advance of 10c. per ton in the ruling price for egg, stove and chestnut sizes, and 5c. on pea, which is approximately the amount of the tax, but up to the present time, no decisive action has been taken. It is understood that some of the large companies contemplate increasing the price of the coal, rather than adding the tax to invoices as a separate item. It is also stated that one or more of the various interests may institute proceedings to test the legality of the new law. As yet, nothing seems certain, except that the consumer will ulimately pay the tax.

In every direction, one hears nothing but good of the bituminous industry. New contracts are being taken at considerable advances over quotations made six weeks or two months ago for the same business, and a postponement of purchases from one day to another, is likely to have the effect of an advance of anywhere from 10 to 15c. Buyers seem to realize this, and are accepting quotations for spot deliveries without any special canvassing of the market for better prices. The trade is in marked contrast with existing conditions for years past at this season of the year. It is really the only industry that can be said to indicate a prosperous condition, both as regards demand and prices, and operators generally do not look for a let down in the near future.

BALTIMORE, MD.

The heavy demand from the West and Northwest has more than taken up any slackness in the local situation. Better grades almost entirely out of the market. Consumers who failed to contract in the spring are now hard pressed.

This is the most active June in the history of the local coal trade. The heavy call from the West and Northwest has more than made up for any inclination to sag in the Eastern field as a whole. West Virginia operators are now pressed to get any decent kind of coal, while in Pennsylvania producers are sold up on all but the worst grades and are now busy filling their contracts.

The city board of awards has finally decided to allow the various departments to buy independently. Because of this ruling the Georges Creek Coal Co. withdrew its bid for the first installment of a bulk contract, or 40,000 tons.

There is already an advancing market in West Virginia. Slack remains low in price by reason of heavy screenings to supply the three-quarter demand at the lakes; otherwise the minimum is now $1.05. About the same condition exists for low-grade coals in Pennsylvania, while the better varieties are now hard at around $1.40. Interests which came in grudgingly during March and April at from $1.15 to $1.25 for the season are now congratulating themselves.

Anthracite business is not at all brisk, and there is the usual summer complaint from dealers. Some of the mines have notified agencies here of curtailment of production for a time, but there is sufficient coal of all grades to meet any demands.

TOLEDO, OHIO

Steam coals are in strong demand and coal dealers appear to be well sold up. Lake movement continues heavy and stronger than in previous seasons. Railroad movement good, but some congestion.

Domestic trade has been a little slow during the past week, due partly to the fact that all the farmers are busy with crops and partly because of the difficulty experienced in securing men to unload coal. Steam coal is in strong demand and locally, coal men are practically sold up on Pocahontas. The lake movement continues strong and boats are being loaded as fast as the equipment is able to take care of them. The lake movement is considerably stronger than it has been other seasons at this time.

The railroads throughout this section are in much better shape than they were a year ago when the congestion occured. There are some complaints at Detroit, which is short of yard space, a condition which cannot easily be remedied because all available space has been taken up. This greatly affects the Toledo traffic situation because it is depended upon to take care of the cars for which there is no yard space in Detroit. The congestion is not likely to be so bad as last year, however, as the railroads have been adding materially to their equipment and the Lake Shore improvements have added greatly to the trackage.

Prices quoted in Toledo are as follows:

	Pocahontas	Hocking	Jackson	Pomeroy	Massilon	Pitts. No. 8	Cambridge
Domestic lump	$2.50	$1.60	$2.50	$1.75	$2.50	$1.35	$1.35
Egg	2.25	1.20	2.50	1.50	2.50	....	....
Nut	1.80	1.20	2.25	1.50	2.50	....	....
¾ lump	....	1.35	....	....	....	1.20	1.20
Mine-run	1.50	1.10	....	....	....	1.10	1.10
Slack	....	0.70	....	....	....	0.80	....

BUFFALO, N. Y.

Impossible to contract at the prevailing circular. Situation so tight that considerable uneasines has developed. Many operators forced into the open market to fill out their contract obligations. Car shortage developing.

Bituminous dealers agree that they have never seen such conditions in their trade. While jobbers complain that they are much less in control than are the operators they are doing their share of business. Consumers are in no sort of control.

It is out of the question to get contracts, either from jobbers or operators at current prices. Some are asking an advance and other are refusing to consider them at all. It is risky for a jobber to make a contract at any price unless he has the coal assured. There are bituminous operators belonging to the Buffalo trade, out begging for coal to fill their contracts, as they have given up all expectation of producing coal required from their own mines.

Nobody is really well supplied and it is a long time since there has been any coal waiting on track for a buyer. Conditions are so hard that considerable uneasiness has developed. If it eases off gradually back to the normal there will be no trouble, but if there is a slump it will carry a lot of people with it. Many causes for the unusual situation are suggested, but, of course, it is either the actual consumption or the expected consumption that has brought it about. In the East, at least, there is no accumulation of coal in consumers' hands and there is no chance for it until conditions change. An increase in the car shortage is everywhere reported.

Quotations are therefore firm, with sizes still somewhat stronger than slack at $2 for Pittsburgh lump, $2.80 for three-quarter, $2.65 for mine-run and $2.15 for slack. Allegheny Valley prices are about 25c. lower than Pittsburgh. There is still much of the former refusal to pay asking prices for coke, which is quotabe at $4.85 for best Connellsville foundry.

The real activity in anthracite is in the lake trade. Locally the buyer who does not lay in his supply by June is going to wait until fall for it. The rail lines are fairly active, though it is reported that there are not many orders ahead. The trade is entirely of the hand-to-mouth order. The Pennsylvania tax controversy has spoiled most of the trade that existed last month.

The shipments by lake are the heaviest in the history of the trade, the only question being whether the upper-lake market is to be satisfied before the lakes close. For the week the shipments were 201,600 tons.

COLUMBUS, OHIO

Activity still characterizes the local coal trade. The demand for all grades remains good and prices are well maintained. No cutting of quotations is necessary to stimulate buying. The prospects for the future are good in every respect.

One of the best features of the trade is the good demand for domestic grades. Stocking on the part of consumers has started much earlier than usual and as a result retailers are placing large orders both for immediate and future deliveries; retail stocks are generally light although dealers are making every effort to increase them.

Lake trade is also one of the active departments of the market. The Northwest is still demanding a large tonnage and chartering of bottoms is going on for the remainder of the season. The tonnage on the docks of the upper lake ports is being moved steadily and there is no especial congestion reported. Dock prices remain the same at the level fixed earlier in the season. So far the Hocking Valley docks at Toledo have loaded 1,310,000 tons of coal since the opening of navigation. The steam business is also one of the steady features of the trade. Factories, especially those in iron and steel lines are taking a good supply of fuel. There is a tendency to increase the requirement of many factories and railroads are taking their usual supply.

The car supply in most of the Ohio mining districts has been good. In eastern Ohio it is estimated that the production has been almost normal and the same is true of the strictly domestic fields and the Hocking Valley district. In the Pomeroy Bend the output is estimated at 85 per cent. of normal.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.60		$1.60	$1.60
¾ inch	1.45	$1.20	1.40	1.40
Nut	1.25		1.35	
Mine-run	1.25	1.10	1.25	1.20
Nut, pea and slack	0.60		0.65	0.60
Coarse slack	0.50	0.70	0.55	0.50

HAMPTON ROADS, VA.

Heavy movement in from the mines, but there is still a shortage and prompt tonnages are commanding good figures.

Dumpings over the various piers during the past week have been good, but not as heavy as expected. There is still a shortage of coal although conditions are improving somewhat, and it is hoped that the heavy accumulated vessel tonnage will shortly be loaded and away; large shipments of coal are now coming in from the mines.

Such suppliers as had any free coal during the week have been asking from $2.90 to $3 a ton, but it is not believed that any sales were made at over $2.95. Any sales made during the week have been for immediate movement where vessels were in port and it was imperative that they be gotten out quickly. Foreign shipments have been about normal and coal has moved to Havana , Panama, Para, Manos, Rio de Janeiro and one or two other South American ports.

LOUISVILLE, KY.

Demand from the Northwest sufficient alone to keep the trade steady. Large tonnages being stocked for the winter trade. New equipment on the L. & N. R.R.

With the near approach of fall, the market is naturally becoming stronger. The heavy movement into the North and Northwest continues unabated and is of sufficient volume to keep the local market steady in itself. Both the steam and domestic grades are strong.

In the western Kentucky field the market is growing steadily firmer and there appears to be a shortage developing on pea and slack. Some sales are reported at 60 to 65c. with rumors of even higher figures. This situation will probably be relieved, however, when the movement of domestic sizes bcomes more regular.

The Louisville & Nashville R.R. is introducing some large hopper bottom equipment, that is causing considerable trouble in the trade; unloading is greatly delayed and cost of same materially higher. It is stated that the company anticipates replacing all their old equipment with this new type so that dealers would do well to prepare for it.

BIRMINGHAM, ALA.

No unusual surpluses and the trade is readily absorbing the full production. Car shortage becoming steadily worse and promises to be more acute this fall than for years.

There has been no change worthy of mention in the local coal market. At present prices the trade seems to absorb all coal offered. Reports from various ports supplied by Alabama coal indicate that there is no unusual surplus on hand at these points; in fact, the amount of coal on car service is reported to be at a minimum. It is believed that labor troubles of a serious nature, which have threatened from time to time, have blown over and that all uneasiness of delay from this source during the summer has disappeared.

There is still a serious car shortage on several roads with no hope in sight for improvement. Unless the unexpected happens in this line, those in closest touch with the coal situation say that before the close of the coming winter there will be one of the worst car shortages ever experienced by this district.

The coke market is apparently unchanged, but it would not be surprising should the furnace-coke situation show weakness at any time.

INDIANAPOLIS

Recent advance is quotations has stimulated buying, consumers seeking to cover before another rise occurs. Strike settlement West Virginia does not appear to be affecting the local situation.

Local dealers are wondering what effect the reported settlement of the strike in Virginia will have on coal prices, if any. They gave that as the reason for the 50c. advance in prices here the first of the month and their customers are asking if the 50c. will be taken off again, now that the miners have agreed to go back to work. They are also wondering if they will be able to get Virginia coals any easier and in any larger quantity. The opinion seems to be that there is small likelihood of a reduction. The retail trade is good for July. The advance in prices has stimulated consumers of the domestic grades to lay in supplies before another raise occurs. Wholesalers say that while the usual July quietness prevails with them, the number of inquiries grows and indicates a considerable stir in orders later on. The demand for steam coal by the industries is up to the average and the thresher trade is about at its height.

Indiana has comparatively little use for the hopper car. In Indianapolis, for instance, there is not one yard that has elevated tracks. This situation may change soon, as the city has begun action requiring elevated tracks on all lines entering the city, and the work has been completed at important points. This may lead to the big yards putting in facilities for handling the hopper car. Another thing that may induce them to do this is the growing scarcity of labor for unloading flat cars. The demurrage bills against the yards have never been so big. Where some years ago the cost of unloading was 6c. and 7c. a ton, it is now 10c. and 15c., and at times it goes to 20c. The following are retail prices in this city:

Anthracite, chestnut	$8.00	Hocking Valley lump	$4.50
Anthracite, stove and egg	7.75	Luhrig lump	4.50
Anthracite, grate	7.50	Luhrig washed egg	4.75
Pocahontas, forked lump	5.50	Cannel	6.50
Pocahontas, shoveled lump	5.00	Linton No. 4 lump	3.25
Pocahontas, mine run	4.00	Linton No. 4 egg	3.25
Pocahontas, nut and slack	3.50	Indiana washed egg	3.50
Blossburg	5.50	Brazil block	4.00
Jackson (Ohio)	5.25	Indianapolis lump coke	6.00
Kanawha lump	4.50	Indianapolis crushed coke	6.00
Kanawha egg, nut	4.50	Connellsville lump	7.00
Pittsburg lump	4.50	Citizens' egg coke	6.00
Raymond lump	4.50	Citizens' nut coke	6.00
Winifrede lump	4.50		

DETROIT, MICH.

Slack in the strongest demand for this period it has been for years. Other grades quieter except Pocahontas which is in short supply.

Bituminous—The number of cars on track has dropped off materially during the past few days and there is a most unusual shortage of fine coal, which was in such long supply a few weeks ago; slack has not been in such sharp demand at this period of the year for a number of seasons. It is stated that a number of the large operators are unable to supply their customers and the latter are being forced into the open market, creating a strong demand and a general hardening of prices. Hocking slack is strong at 50c. f.o.b. mine, while No. 8 cannot be had at less than 70c. On the other grades the market is quieter than last week with the exception of Pocahontas which continues scarce; for August delivery lump and egg is quoted at $2.50 but is not in great demand at this figure. The smokeless coal is entirely sold up for July and what the situation will be in September it is difficult to say.

Big consuming interests that held off contracting with the intention of going through a good part of the summer in a low-priced open market and then closing in when quotations began to advance are now in bad shape. Not a few are already buying at prices in advance of what they could have contracted at for the entire year.

The local market is quotable on about the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump.	$1.45	....	$1.50	....	....	$2.50	$2.25
Egg	1.45	....	1.50	....	....	2.50	2.25
Steam lump	1.25	....	....	....	....	....	....
¾-in. lump	1.10	$1.10	....	$1.10	$1.10	....	....
Mine-run	1.00	1.00	1.00	1.00	1.00	1.50	....
Slack	0.80	0.85	0.50	0.70	0.70	1.20	....

Anthracite—There are uniform reports from all dealers of an active business in hard coal; the outside demand from different parts of the state is mostly responsible for this condition.

Coke—The decline in this product still continues. High sulphur, Connelsville, is now being quoted at $2.10, and 72-hr. at $2.70 to $2.80. Semet Solvay is selling at $2.75 with gashouse at $2.65. The local furnaces are mostly closed down so that the demand for coke is light.

CHICAGO

Prices showing a strong rising tendency. Labor so short that it is difficult to unload cars promptly. Car situation becoming steadily tighter and a severe shortage this fall seems inevitable.

A rising market and a shortage of labor are the chief features in the local situation. There has been an upward turn in the price of almost every kind of domestic coal and there will be an advance, Aug. 1, on all Illinois coal, ranging from 10c. to 25c. a ton; there will also be an increase on the cost of Hocking grades of 15c. a ton.

Retail dealers find it unusually difficult to obtain sufficient help to unload their cars. The farmers are offering fancy prices for laborers and they are flocking to the harvest fields. Another complication is the increasing shortage in cars. Several of the Western roads are well equipped to handle a large coal tonnage, but many others are short of equipment with the result that the situation is steadily becoming worse. Several of the lines have requested shippers to put in as much coal as possible in storage now, as a widespread congestion of freight traffic in the fall seems inevitable.

Prevailing prices are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump	$1.97@2.07	$2.55	$2.27	
Egg		2.55		$4.05@4.30
Steam lump	1.82@1.87		2.07	
Mine-run	1.77@1.82	$2.20@2.30	1.87	3.55@3.65
Screenings	1.57@1.62	1.85@1.90	$1.57@1.62	

Coke—Connellsville and Wise County, $5.25@5.50; byproduct egg and stove, $4.85; byproduct, nut, $4.75@4.85; gas house $4.50@4.60.

ST. LOUIS, MO.

The situation has continued to improve during the past week. Prices on nearly all grades have advanced. Mines closed for the summer are not due to open until the first of September.

Improved conditions in the local coal situation have been apparent for the past week, as there has been an advance in price on all grades of coal, with the exception of screenings and Carterville nut. Standard lump advanced and all other domestic coals followed, and indications are that the increase will continue weekly until the middle of September or the first of October, when a high point will have been reached.

With the screenings market taken away, there will be an over-production of this grade, which will demoralize the market and force the operators to get more money for other sizes. Up to the present screenings have been the main stay of the local market, and all other grades have been gaged by the prices on them. This power will not affect the Carterville market as much as the Standard, but it will have some influence.

The only advances in coals for the first of July were on some of the Franklin County grades. Contrary to prophesies made in the early part of the season, there seems to be an overproduction of anthracite for the St. Louis market, and a great deal of it is being rejected on account of being off-grade, although the operators claim that St. Louis is the only point where they are having trouble of this nature.

The coal movement from the mines has been free and there is little complaint, except as to equipment. The railroads have been buying hopper bottoms and as few of the local yards are fitted to handle these, the cause for complaint is easy to be seen. It is probable, however, that most of the yards will be equipped for hoppers in the course of a few months.

The fifty-five cars a day of screenings that a St. Louis jobber had been commissioned to buy for several years past for the Union Electric Light & Power Co. and the United Rys., have been dumped on the market on account of the Keokuk electric power, and this has demoralized the steam market. Carterville dropped from 95 to 90c. down to 60 to 65c. in the course of ten or twelve days, and Standard screenings have fallen off about 15c. a ton. As the demand for lump increases the production of screenings does likewise and the price will go down correspondingly.

Several mines that have been idle for the summer months will not start up until the first of September, so that conditions for the next four or five weeks will not be as bad as they were a year ago when mines for the most part started up on Aug. 1.

The prevailing circular is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.87½
3-in. lump	.....	.....	$1.20	.....
6-in. lump	$1.25 @ 1.35	.....	1.30	1.00
Lump and egg	.....	$2.00	1.30	.....
No. 1 nut	1.00 @ 1.15	.....	1.05	0.87½
Screenings	0.60 @ 0.65	.....	.....	0.80
Mine-run	1.10	.....	.....	0.75
No. 1 washed nut	1.40 @ 1.50	.....	.....	.....
No. 2 washed nut	1.25 @ 1.35	.....	.....	.....
No. 3 washed nut	1.15 @ 1.20	.....	.....	.....
No. 4 washed nut	1.10 @ 1.20	.....	.....	.....
No. 5 washed nut	0.80 @ 0.90	.....	.....	.....

OGDEN, UTAH

Believed the summer stocking is being neglected, which may result in a serious shortage in the fall. Mines working short time as a result of the slack demand, but the market is being well maintained.

May, June and July have presented conditions in the coal market that have puzzled the operators. In previous years, these three months have always been termed the "storage period" and coal has, as a rule, moved freely to the trade; the railroads have always reduced the freight rate, and the operators made a similar reduction in the mine price, so as to induce the dealer and steam coal user to lay in a supply of coal. This year, the railroads refused to lower the freight rate and while the operators made their customary reduction with an additional discount to take care of the usual concession in freight rate, the fact that the roads offered no inducements seems to have lead the dealer to believe it would not be necessary to store coal this year. Further, there has been considerable agitation in regard to a permanent freight rate reduction, and this in connection with the general belief that there is an abundance of coal, has caused shipments during the storage period to be small.

Every year there is a bad car shortage at the Wyoming and Utah Mines during September, October and November, and it is during this period that the bulk of the coal stored is delivered to the consumer. When compared with the same period last year, it is estimated that 35% of the amount of coal is in storage, which means that the balance of 65% must be shipped during the fall and winter when the demand is greater than the production.

There has been a good market for nut and slack coal, due to the small production of lump. Nut coal is preferred to the lump during the summer months, and as the mines have been working short time the market has consumed practically all the slack produced. The sugar factories in the Inter-mountain territory have commenced to store some coal, which has

given a little encouragement to the market. Indications are that there will be an increase in the mine price Aug. 1.

Present quotations for shipment to Nebraska, Kansas and California are: Lump, $2.50; nut $2; mine-run, $1.75; slack, 90c. To Utah and the Northwest: Lump, $2.25; nut, $1.75; mine-run, $1.75; slack, $1.

SPOKANE, WASH.

Some new contracts in the Rocky Mountain region.

The contracts for the six educational institutes in Idaho were awarded to the United States Coal Co. at the following figures: 450 tons of No. 1 lump for Albian delivery at $7.65, the price last year having been $10; Pocatello delivery, 575 tons of No. 1 lump at $4.40, as compared with $4.75 last year; 225 tons of No. 1 lump for Gooding delivery at $5.90, as compared with $7.50 the year before; for St. Anthony delivery, 1500 tons of No. 5 mine-run at $4.25, as compared with $4.40 last year; for Lewiston delivery, 550 tons of Roslyn lump at $7 per ton, as compared with $8.50 last year; for Moscow delivery, 200 tons of No. 1 Kinsmur lump at $6.90, as compared with $7.65 last year; for the same delivery 1000 tons of Roslyn lump at $6.25, as compared with $6.35 last year.

PORTLAND, ORE.

Market at the low point of the year. Preparations for the opening of the Panama.

This is the quiet season of the coal business here and there is little doing, except in preparation for the business that will follow later in the year. Apparently no coal will be imported here this year from Australia, but supplies will come from Washington, Wyoming and Utah. Every effort is being made to prepare for a large volume of shipping upon the completion of the Panama Canal and with this shipping will follow a considerable increase in the demand for bunker coal.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN RY.

The following is a statement of tonnages shipped over this road from mines in West Virginia and the commercial and company coal, for the month of June, in short tons:

Field	Shipped	Tipple	Total	Commercial	Company
Pocahontas	2,215,970	15,163	1,231,133	1,232,716	90,555
Tug River	214,854	2,485	217,339	178,091	39,248
Thacker	272,930	12,835	285,765	208,741	77,024
Kenova	74,944	15,802	90,746	72,557	18,189
Clinch Valley				133,128	11,662
	1,778,698	46,285	1,824,983	1,825,233	236,678

Shipments of coke entirely from the Pocahontas field, were 96,138.

COAL TRADE NEWS

The Smoke Nuisance in New York—The Court of Special Session recently declared Section 181 of the Sanitary Code, providing for the elimination of smoke, to be "unconstitutional and unreasonable." The case involves some 100 complaints lodged against the New York Edison Co. Health Commissioner Lederle expressed himself as much disappointed with the outcome and stated that if an appeal was not successful that a new ordinance would have to be introduced or all suits of this character suspended.

New Equipment on the Louisville & Nashville R.R.—The L. & N. are replacing their old equipment with new hopper bottom cars at the rate of 60 per day; about 3000 of the new cars will be put in commission immediately and the road plans to eventually replace all of their equipment with this new type of car. It is what is known as the "battleship" type and has a capacity of 110,000 lb. as compared with 80,000 to 90,000 lb. for the steel gondolas.

Heavy Coal Traffic—Total coal shipment through No. 4 Lock for the first six months amounted to 105,000,028 bushels, an increase of 27,000 bushels over the same period in 1912. There are also more than 6000 cars of coal a day being handled by the Pennsylvania R.R.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending July 19:

Stocks	Week's Range High	Week's Range Low	Last	Year's Range High	Year's Range Low
American Coal Products	87	87	87	87	87
American Coal Products Pref	109¼	109¼	109¼	109¼	109¼
Colorado Fuel & Iron	30	26¾	29¼	41¼	24¼
Colorado Fuel & Iron Pref	....	....	155	155	150
Consolidation Coal of Maryland	102¼	102¼	102¼	102¼	102¼
Lehigh Valley Coal Sales	195	190	190	....	....
Island Creek Coal Com	49	48	49	....	....
Island Creek Coal Pref	79½	79	79	....	....
Pittsburgh Coal	17	15⅞	17	24⅜	14½
Pittsburgh Coal Pref	81	77½	81	95	73
Pond Creek	17½	16½	17	23⅜	16½
Reading	160⅜	156½	159⅝	168⅞	151⅜
Reading 1st Pref	....	....	86	92½	86
Reading 2nd Pref	87	86	87	95	84
Virginia Iron, Coal & Coke	39	37	37⅞	54	37½

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	95	96	93⅜	June '13	93⅜	99½
Colo. F. & I. gen. 6s	..	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	80	81	79¾	79¾	77½	85
Cons. Ind. Coal Me. 1st 5s	..	..	85	June '11	..	..
Cons. Coal 1st and ref. 5s	..	92½	93	Oct. '12	..	..
Gr. Riv. Coal & C. 1st g 6s	..	100	102½	April '06	..	..
K. & H. C. & C. 1st s f g 5s	..	96	98	Jan. '13	98	98
Pocah. Con. Coll. 1st s f 5s	..	86	86½	June '13	86	87½
St. L. Rky. Mt. & Pac. 1st 5s	73	78	76	June '13	76	80
Tenn. Coal gen. 5s	99½	99½	99¾	99¾	99¾	103
Birm. Div. 1st consol. 6s	100½	101½	101	April '13	101	103
Tenn. Div. 1st g 6s	100¼	101½	100¼	100¼	100¼	102
Cah. C. M. Co. 1st g 6s	..	103	110	Jan. '09	..	..
Utah Fuel 1st g 5s	..	..	..	..	..	..
Victor Fuel 1st s f 5s	..	80	80	May '13	79½	80
Va. I. Coal & Coke 1st g 5s	92½	92½	92¼	93	92	98

Burns Bros.—Regular quarterly dividend No. 2 on the preferred stock of $1.75 payable Aug. 1 to holders of record July 1.

FOREIGN MARKETS

GREAT BRITAIN

July 11—Admiralties are very scarce for prompt shipment. For smalls the demand is quiet and with an ample supply, the tendency is rather easier.

Quotations are approximately as follows

Best Welsh steam	$4.92@5.04	Best Monmouthshires	$4.20@4.26
Best seconds	4.56@4.68	Seconds	4.08@4.14
Seconds	4.32@4.44	Best Cardiff smalls	2.52@2.58
Best dry coals	4.32@4.56	Seconds	2.28@2.46

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

INDIA

A recent issue of the "Colliery Guardian," London, England, says editorially:

With the readjustment of Bengal's boundaries and the creation of the new province of Bihar and Orissa, the more important coalfields now belong to the new province; figures for production will, therefore, embrace both provinces. We understand from the "Statesman" (India), of May 28, 1913, that the production in Bengal during 1911 of 11,468,904 tons has risen in 1912 for Bengal, with Bihar and Orissa, to 13,429,566 tons, an increase of 17 per cent. For the whole of British India, excluding native states, the production advanced from 12,048,726 tons to 14,044,368 tons.

FOREIGN TRADE OPPORTUNITIES

The United States Counsellor Service reports opportunities in foreign coal markets as follows: complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers.

South America—A counsel in this country reports that a company in his district is interested in American coal and briquettes. The coal should be hard and weather well since the fine grades sell at a large discount. Full particulars including analysis of the coal with prices f.o.b. both the United States ports and ports of destinations should be given. **No. 11,248.**

Europe—Counsellor in a European country reports the construction of a plant for the manufacture of cement which will have an initial consumption of 35,000 tons of coal per annum the first year and 70,000 tons the second. **No. 11,324.**